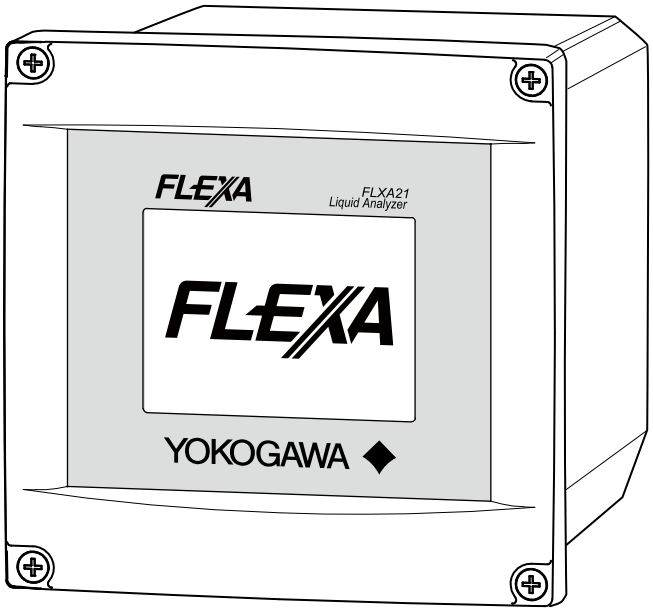
User's Manual

FLXA21
2-Wire Analyzer
PROFIBUS PA Communication

IM 12A01A02-72E



YOKOGAWA
Yokogawa Electric Corporation

IM 12A01A02-72E
3rd Edition

Introduction

Thank you for purchasing the FLXA21 2-Wire Analyzer.

Please read the following respective documents before installing and using the FLXA21.

This manual describes only those topics that are required for operation of the PROFIBUS PA communications.

For information about the FLXA21 other than PROFIBUS PA, refer to the User's Manual (IM 12A01A02-01E).

Notes on Handling User's Manuals

- Please hand over the user's manuals to your end users so that they can keep the user's manuals on hand for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these user's manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
- No part of the user's manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- YOKOGAWA reserves the right to make improvements in the user's manuals and product at any time, without notice or obligation.
- If you have any questions, or you find mistakes or omissions in the user's manuals, please contact our sales representative or your local distributor.

Drawing Conventions

Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.

Some screen images depicted in the user's manual may have different display positions or character types (e.g., the upper / lower case). Also note that some of the images contained in this user's manual are display examples.

Model Name used in this Manual

The model names, FLXA21-PH and FLXA21-SC, are used in this manual.

The FLXA21-PH means the FLXA21 with the output of PROFIBUS PA communication and with measurement of pH and/or ORP. The exact model & style code is as follows;

FLXA21-D-P-D-AA-**P1**-NN-P-N-LA-N-NN (1st input: pH/ORP)
or
FLXA21-D-P-D-AA-**S1**-NN-P-N-LA-N-NN (1st input: pH/ORP (SENCOM sensor))

And, the FLXA21-SC means the FLXA21 with the output of PROFIBUS PA communication and with measurement of conductivity. The exact model & style code is as follows;

FLXA21-D-P-D-AA-**C1**-NN-P-N-LA-N-NN (1st input: Conductivity (SC))

Media No. IM 12A01A02-72E 3rd Edition : Oct. 2015 (YK)

◆ Safety Precautions

■ Safety, Protection, and Modification of the Product

- In order to protect the system controlled by the product and the product itself and ensure safe operation, observe the safety precautions described in this user's manual. We assume no liability for safety if users fail to observe these instructions when operating the product.
- If this instrument is used in a manner not specified in this user's manual, the protection provided by this instrument may be impaired.
- If any protection or safety circuit is required for the system controlled by the product or for the product itself, prepare it separately.
- Be sure to use the spare parts approved by Yokogawa Electric Corporation (hereafter simply referred to as YOKOGAWA) when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- The following words are used this manual.

CAUTION

This symbol gives information essential for understanding the operations and functions.

NOTE

This symbol indicates information that complements the present topic.

■ Warning and Disclaimer

The product is provided on an "as is" basis. YOKOGAWA shall have neither liability nor responsibility to any person or entity with respect to any direct or indirect loss or damage arising from using the product or any defect of the product that YOKOGAWA can not predict in advance.

FLXA21

- The FLXA21 should only be used with equipment that meets the relevant IEC, American, Canadian, and Japanese standards. Yokogawa accepts no responsibility for the misuse of this unit.
- Don't install "general purpose type" instruments in the hazardous area.
- The Instrument is packed carefully with shock absorbing materials, nevertheless, the instrument may be damaged or broken if subjected to strong shock, such as if the instrument is dropped. Handle with care.

CAUTION

Electrostatic discharge

The FLXA21 contains devices that can be damaged by electrostatic discharge.

When servicing this equipment, please observe proper procedures to prevent such damage.

Replacement components should be shipped in conductive packaging. Repair work should be done at grounded workstations using grounded soldering irons and wrist straps to avoid electrostatic discharge.

CAUTION

- Do not use an abrasive or organic solvent in cleaning the instrument.
- Substitution of components may impair suitability for Division 2.

  Do not remove or replace while circuit is live unless area is known to be non-hazardous.

  Explosion Hazard – Do not disconnect equipment unless area is known to be nonhazardous.

  Do not reset circuit breaker unless power has been removed from the equipment or the area is known to be non-hazardous.

- This instrument is a EN61326-1 Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

How to dispose the batteries:

This is an explanation about the new EU Battery Directive (DIRECTIVE 2006/66/EC).This directive is only valid in the EU.

Batteries are included in this product. Batteries incorporated into this product cannot be removed by yourself. Dispose them together with this product.

When you dispose this product in the EU, contact your local Yokogawa Europe B.V. office. Do not dispose them as domestic household waste.

Battery type: Manganese dioxide lithium battery

Notice:  The symbol means they shall be sorted out and collected as ordained in ANNEX II in DIRECTIVE 2006/66/EC.

Regulatory Compliance

Safety: UL 61010-1
UL 61010-2-030
CAN/CSA C22.2 No.61010-1
CAN/CSA-C22.2 No.61010-2-030

EMC: EN61326-1 Class A, Table 2 (For use in industrial locations)
Influence of immunity environment (Criteria A): ±25% of F.S.
EN61326-2-3
EN61326-2-5
AS/NZS CISPR11
Korea Electromagnetic Conformity Standard Class A 한국 전자파적합성 기준

A급 기기 (업무용 방송통신기자재)
이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는
사용자는 이 점을 주의하시기 바라며, 가정외의 지역에서
사용하는 것을 목적으로 합니다.

Installation altitude: 2000 m or less
Category based on IEC 61010: I (Note 1)
Pollution degree based on IEC 61010: 2 (Note 2)

Note 1: Installation category, called over-voltage category, specifies impulse withstand voltage. Equipment with “Category I” (ex. two-wire transmitter) is used for connection to circuits in which measures are taken to limit transient over-voltages to an appropriately low level.

Note 2: Pollution degree indicates the degree of existence of solid, liquid, gas or other inclusions which may reduce dielectric strength. Degree 2 is the normal indoor environment.

Warranty and service

Yokogawa products and parts are guaranteed free from defects in workmanship and material under normal use and service for a period of (typically) 12 months from the date of shipment from the manufacturer.

Individual sales organisations can deviate from the typical warranty period, and the conditions of sale relating to the original purchase order should be consulted. Damage caused by wear and tear, inadequate maintenance, corrosion, or by the effects of chemical processes are excluded from this warranty coverage.

In the event of warranty claim, the defective goods should be sent (freight paid) to the service department of the relevant sales organisation for repair or replacement (at Yokogawa discretion). The following information must be included in the letter accompanying the returned goods:

- Part number, model code and serial number
- Original purchase order and date
- Length of time in service and a description of the process
- Description of the fault, and the circumstances of failure
- Process/environmental conditions that may be related to the failure of the device.
- A statement whether warranty or nonwarranty service is requested
- Complete shipping and billing instructions for return of material, plus the name and phone number of a contact person who can be reached for further information.

Returned goods that have been in contact with process fluids must be decontaminated/ disinfected before shipment. Goods should carry a certificate to this effect, for the health and safety of our employees.

Material safety data sheets should also be included for all components of the processes to which the equipment has been exposed.

Copyright and Trademark Notices

FLEXA, FLXA and SENCOM are registered trademarks of Yokogawa Electric Corporation.

Adobe, Acrobat and Acrobat Reader are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States and/or other countries.

All other company and product names mentioned in this user's manual are trademarks or registered trademarks of their respective companies.

We do not use TM or ® mark to indicate those trademarks or registered trademarks in this user's manual.

FLXA21's fonts

FLXA21
2-Wire Analyzer
PROFIBUS PA Communication

IM 12A01A02-72E 3rd Edition

CONTENTS

1. About PROFIBUS PA

PROFIBUS PA is a widely used bi-directional digital communication protocol that enables the implementation technologically advanced process control systems.

FLXA21 PROFIBUS PA communication type meets the specifications of PROFIBUS PA Nutzerorganisation e.V. and is interoperable with devices from Yokogawa and other manufacturers.

For information on other features, engineering, design, construction work, startup and maintenance of PROFIBUS PA, refer to the PROFIBUS PA Nutzerorganisation e.V. website: www.profibus.com

1.1 Internal Structure of FLXA21

The FLXA21 contains a structured mapping of function blocks. Each function block serves a specific task.

- **Physical block**
  - Manages the status of FLXA21 hardware.
  - Automatically informs the host of any detected faults or other problems.
- **Transducer block**
  - Converts sensor input to process values which are transferred to AI function block by channels.
- **AI function blocks**
  - Conditions raw data from the Transducer block.
  - Outputs conditioned process values
  - Carries out scaling, damping and square root extraction.

1.2 Logical Structure of Each BLOCK

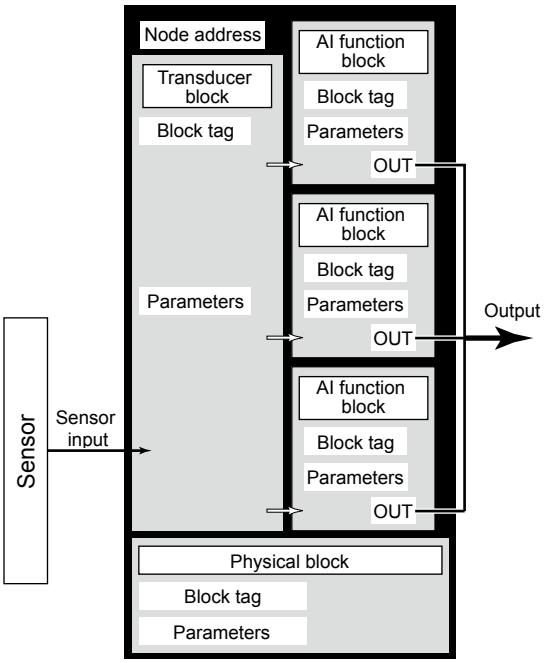


Figure 1.1 Logical Structure of Each Block

Node address, block tags and contained parameters within a function block are structured in the FLXA21 device as shown in figure 1.1.

1.3 Wiring System Configuration

The number of devices that can be connected to a single bus and the cable length vary depending on system design. When constructing systems, both the basic and overall design must be carefully considered to allow device performance to be fully exhibited.

2. Preparation

The FLXA21 PROFIBUS PA is provided with three cable glands. The first is used for the electrode wiring as the other is used for the power wiring shown in figure 2.1.

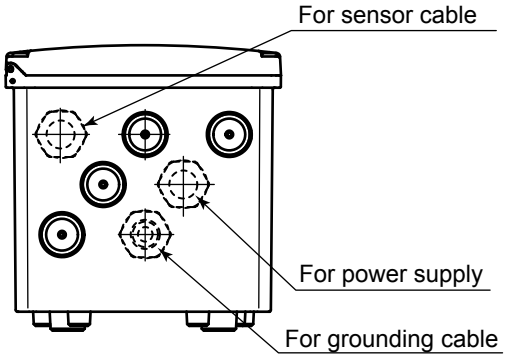


Figure 2.1 Cable gland diagram

2.1 Cables, terminals and glands for PROFIBUS PA

Wire and install the system by referring to chapter 2 in the FLXA21 instruction manual (IM 12A01A02-01E).

The PROFIBUS PA power supply is 9 to 32 V DC. The wiring is the same.

However, for the PROFIBUS PA cables see Table 2.1.

Table 2.1 PROFIBUS PA Cables and transmissible Length

Parameters	Conditions	Type A	Type B	Type C	Type D
Max DC Resistance, Ω/km	per conductor	22	56	132	20
Max Attenuation, dB/km	1.25 f, (39 kHz)	3.0	5.0	8.0	8.0
Gauge	—	#18 AWG (0.82 mm^2)	#22 AWG (0.32 mm^2)	#26 AWG (0.13 mm^2)	#16 AWG (1.25 mm^2)
Max Length, meters	—	1,900	1,200	400	200

Note: 1900 m is trunk + sum of Spurs (Max length type A cable)

Yokogawa recommends the use of Type A.

Usage of Type B and D is restricted.

Yokogawa does not recommend the use of Type C.

Table 2.2 Recommended length of Spur Cables

Number of spur cables	Length of a non-intrinsically safe spur cable
15-16	60 m
13-14	90 m
1-12	120 m

Note: • 1 device per spur.
• Keep as short as possible (min 1 m)

When using a SENCOM module

When using a SENCOM module, you need to use the supplied cable clamp to fix the sensor cables in place. Attach the supplied cable clamp as shown in Figure 2.2.

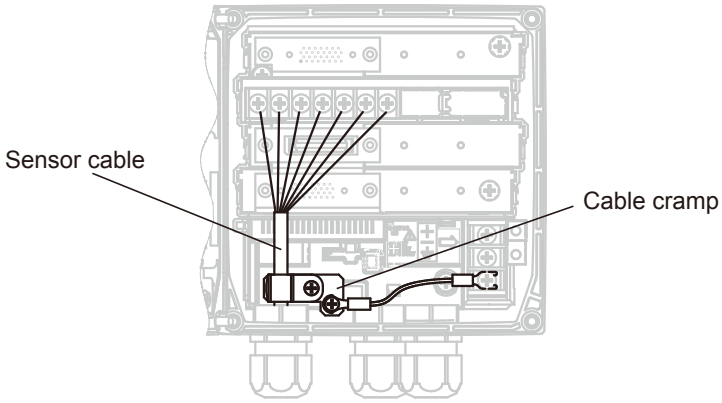


Figure 2.2 When using a SENCOM module

DIP switches

Figure 2.3 shows the DIP switches for setting the address and write protection.

Normally, you do not have the change them from the default settings.

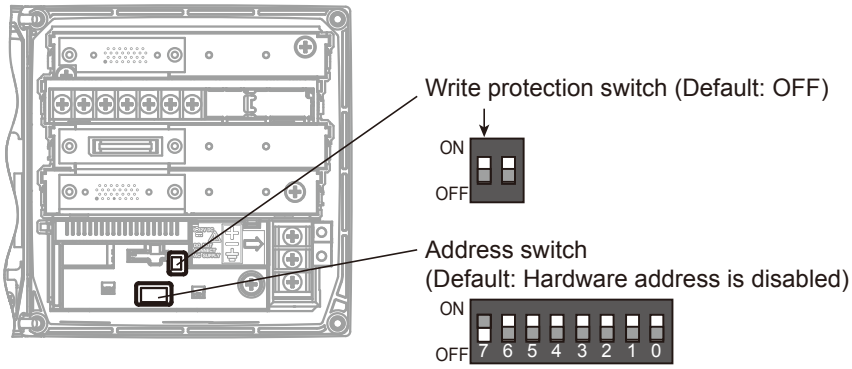


Figure 2.3 DIP switches

2.2 Shielding and grounding

Grounding and shielding of the transmitter is necessary for a safe and reliable operation. Please use one of the following schemes (A or B) as these will give proper shielding and grounding. One should pay special attention to instruments that required an external power supply (besides the 9 to 32 V supplied by the bus).

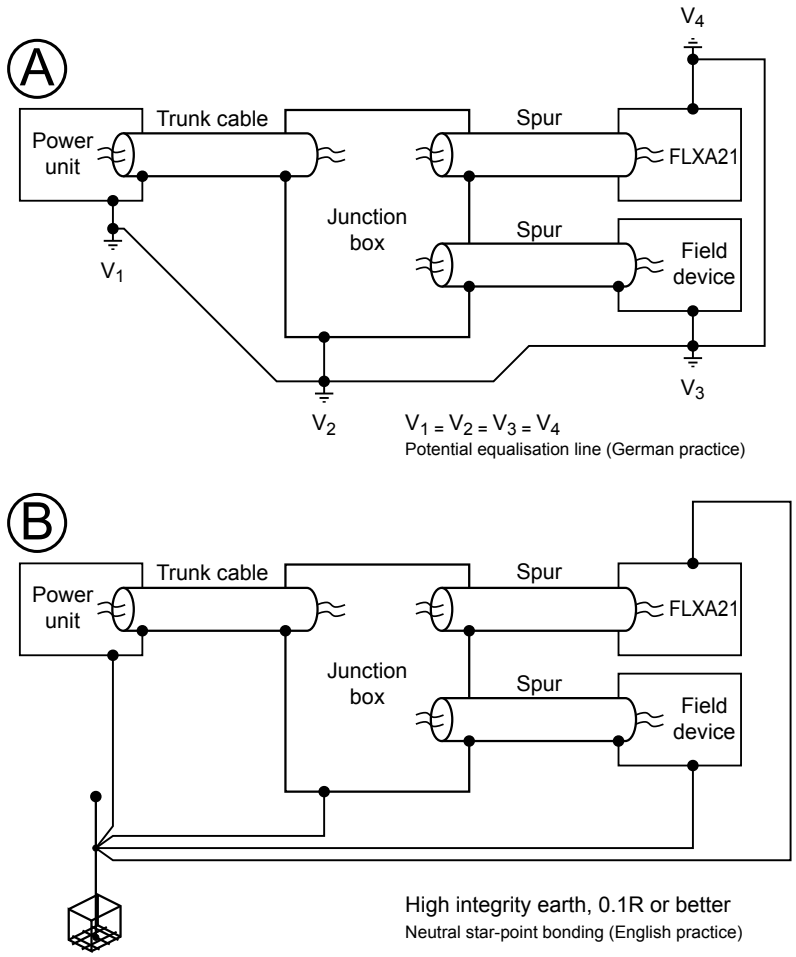


Figure 2.2 Shield and grounding

2.3 How to download EDD for PDM

It takes a certain time to insert EDD to PDM package. If your PDM package doesn't include FLXA21 EDD, download it from the following website.

http://www.yokogawa.com/an/download/an-dl-profibus-001en.htm

*: This address is subject to change without prior notice. If the above address cannot be accessed, consult your nearest sales office or the agency from which you purchased the product.

3. Getting Started

PROFIBUS PA is fully dependent upon digital communication protocol (EN 50170 Volume 2 and IEC 61158 for IS areas, PROFIBUS PA) and differs in operation from the conventional 4 to 20 mA transmission communication protocol. It is recommended that novice users use field devices in accordance with the procedures described in this section. The procedures assume that field devices will be set up on a bench or an instrument shop.

3.1 Connection of Devices

The following instruments are required for use with PROFIBUS PA devices:

- **Power supply:**
  PROFIBUS PA requires a dedicated power supply. It is recommended that current capacity be well over the total value of the maximum current consumed by all devices. Power is supplied by a DP/PA coupler.
- **Terminators:**
  PROFIBUS PA requires two terminators. A terminator shall be located at each end of the trunk cable.
- **Field devices:**
  Connect the PROFIBUS PA communication type field device. Two or more transmitters or other field devices can be connected.
- **DP/PA Couplers:**
  PROFIBUS PA requires DP/PA couplers which convert the RS-485 signals to the IEC 61158-2 signal level and power the field devices via the PROFIBUS PA.
- **Cable:**
  Refer to Table 2.2.

For applications in intrinsically safe areas, the transmission method defined in IEC 61158-2 is used with PROFIUS PA The transmission rate in this case is 31.25 k bit/s. DP transmission via RS-485 to IEC 61158-2 is implemented with the network components (DP/PA coupler or DP/PA link.)

Connect the devices as shown in Figure 3.1. Connect the terminators at both ends of the trunk, with a minimum length of the spur laid for connection.

The polarity of signal and power must be maintained.

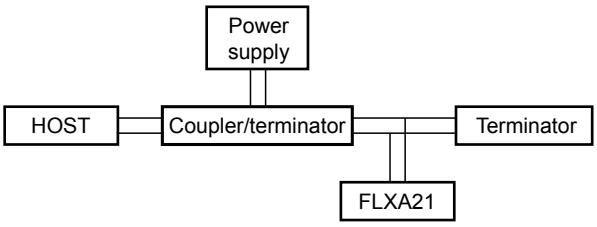


Figure 3.1 Cabling

NOTE

Before using a PROFIBUS PA configuration tool other than the existing host, confirm it does not affect the loop functionality in which all devices are already installed in operation. Disconnect the relevant control loop from the bus if necessary.

CAUTION

Connecting a PROFIBUS PA configuration tool to a loop with its existing host may cause communication data scrambles resulting in a functional disorder or a system failure.

3.2 Host Setting

To activate PROFIBUS PA, the following settings are required for the host.

CAUTION

Do not turn off the power of the device immediately after setting. When the parameters are saved to the EEPROM, the redundant processing is executed for an improvement of reliability. If the power is turned off within 60 seconds after settings are made, the modified parameters are not saved and the settings may return to their original values.

For cyclic data communication a GSD file is required. This file contains all necessary information to start this type of communication. Please make sure the GSD file is in the right directory so the information is available to the HOST. Refer to the HOST's manual for guidance.

For acyclic communication several configuration tools can be used. Each communication tool requires its own device driver. We currently support only **Siemens Simatic PDM** and **Yokogawa FieldMate**. All parameter lists and methods described in this manual are based on this acyclic communication tool. Please make sure the device driver is in the proper directory. Most HOST systems come with an "install device driver" package which places all required files in the designated folders.

3.3 Bus Power ON

Using the host device display function, check that the FLXA21 is in operation on the bus.

Unless otherwise specified, the following settings are in effect when shipped from the factory.

If no FLXA21 is detected, check the available address. Please set all addresses of the devices in advance or separately connect each FLXA21 and set a different address for each. Make sure to note the address after changing it as from this point on the device can only be accessed through this address.

3.4 Bus Address Setup

This section describes the procedure to set Bus Address in the transmitter. Every device in PROFIBUS PA must be assigned a unique address in the range of 0 (0x00) to 126 (0x7e). If it is not specified at the time of order, 126 (0x7e) is the factory default. Do not change to 0, 1 or 2 as these are used by master devices.

You can change the bus address using a communication tool (e.g., PROFI captain). For details, see the instruction manual for the communication tool.

3.5 Notes When Using the FLXA21-SC Concentration Table (when using FieldMate)

The FLXA21-SC concentration table can be read from and written to using the CONC_TABLE_CONCENTRATION_1 to CONC_TABLE_CONCENTRATION_21 and CONC_TABLE_CONDUCTIVITY_1 to CONC_TABLE_CONDUCTIVITY_21 parameters of the transducer block.

However, when using FieldMate, note the following points.

The default concentration table values are “Not a Number”. On the device screen, they appear as blank. On FieldMate, “IEEE: NOT A NUMBER” is displayed.

Values set to “Not a Number” cannot be changed from FieldMate.

If you want to write the concentration table from FieldMate, first set all the items in the concentration table to some value from the device screen.

3.6 PRIMARY/SECONDARY/TERTIARY/ QUATERNARY_VALUE Value Assignment

Measurement values are assigned to PRIMARY_VALUE, SECONDARY_VALUE, TERTIARY_VALUE, and QUATERNARY_VALUE from the device screen.

To set PRIMARY_VALUE, choose Commissioning > Output setup > Output, and then set the Process parameter item on the mA (Output) screen.

For others, choose Commissioning > Advanced setup > Communication > HART, and on the HART setup screen, set SECONDARY_VALUE with the SV item, TERTIARY_VALUE with the TV item, and QUATERNARY_VALUE with the QV item.

CAUTION

Be sure to use the default values for the following settings.

Changing them may disrupt communication.

Commissioning > Advanced setup > Communication screen
Default value: HART

Commissioning > Advanced setup > Communication > HART setup screen
Item name: Network address
Default value: 0

If you want to change the settings from the device, first change Transducer Block Mode (refer also to tables in chapter 6 because not all parameters need OS to allow a change) to Out of Service.

If you want to load the factory settings or change the language, first change Physical Block Mode (refer also to tables in chapter 6 because not all parameters need OS to allow a change) to Out of Service.

Note that when you do, the FLXA21 will restart.

4. Explanation of Basic Item

4.1 Reading cyclic parameters

In general, slave devices exchange data cyclically with the master (class 1, e.g. PLC). The FLXA21 (slave) gets the data from the sensor, makes some calculations and makes the outcome available through analog input blocks. The controller device (Master) requests for these process values, makes some calculation (PID, ratio) and sends the result to an actuator. The FLXA21 contains three analog input blocks and therefore three Process values for cyclic data transfer.

The master class 1 device gets the information (of the FLXA21) by consulting the GSD file. A device specific GSD file should be available for each device and should have an unique identifier. All information necessary for cyclic data transfer is described in the GSD file. Refer to the manual of the Master Class 1 device for these folders. With these files, the Master Class 1 devices are able to start cyclic data transfer.

4.2 Integration of GSD file and IDENT Number

The GSD file and IDENT Number are necessary for PROFIBUS PA communication. Before starting communication, the device must be specified by the GSD file in the host system and the IDENT Number of the device.

The PROFIBUS PA device has a profile IDENT Number and a device-specific IDENT Number. There are GSD files which correspond to each number. The profile GSD file is a general-purpose file which is defined by the kind and number of function blocks of the device. This file helps improve the compatibility among devices.

By setting the PROFIBUS PA IDENT Number (IDENT_NUMBER_SELECTOR) parameter of the physical block, the IDENT Number will be linked with the corresponding GSD file.

Table 4.1 Device specific ID GSD file

Model Name	Device specific IDENT Number	Device specific GSD file
FLXA21-PH	0x45D0	YEC45D0.gsd
FLXA21-SC	0x45D1	YEC45D1.gsd

Table 4.2 Profile ID GSD file

Profile ID	Profile IDENT Number	Profile GSD file
Analyzer	0x9750	pa139750.gsd

Beforehand one must configure which information will be exchanged.

There are two kinds of configurations possible. The Identifier byte (or short identifier) and the Extended Identifier Format (or long identifier). The FLXA21 supports both kinds of configurations. The user can choose either “Analog Input (short)” or “Analog Input (long)” and will end up with the same result.

The function blocks of the FLXA21 are in a specific order. The configuration of the cyclic data should be done in the same order.

For the FLXA21. The process values are mapped as follows on default.

		FLXA21-PH	FLXA21-SC
slot (1)	“AI1”	pH	Conductivity
slot (2)	“AI2”	Temperature	Temperature
slot (3)	“AI3”	Empty	Empty

The AI1/2 measurement items assigned to each slot are determined according to Channel (AI) as well as PRIMARY, SECONDARY, TERTIARY, and QUATERNARY Type (Transducer Block). For details, see the description of each item.

The GSD file of the FLXA21 specifies 3 modules:

;Empty module

Module = “Empty Module” 0x00

1

EndModule

;Modules for Analog Input

Module = “Analog Input (AI)short” 0x94

2

EndModule

;Modules for Analog Input

Module = “Analog Input (AI)long” 0x42,0x84,0x81,0x81

3

EndModule

;--- Description of the module assignment: ---

;

SlotDefinition

Slot(1) = “AI1” 3 1,2,3

Slot(2) = “AI2” 3 1,2,3

Slot(3) = “AI3” 3 1,2,3

Examples:

- Configuring the output of the AI block 1 (pH) and the output of AI block 2 (temperature): “Analog Input (short) “ and “Analog Input (short) “ and “Empty Module” or “0x94, 0x94, 0x00”
- Configuring the output of AI block 1 (pH) only: “Analog Input (long) “ and “Empty module” and “Empty module” or “0x42, 0x84, 0x81, 0x81, 0x00, 0x00”

NOTE

Most Master Class 1 devices have an advanced Human Machine Interface and will guide you through these configurations.

4.3 Reading acyclic parameters

Communications occur on a peer-to-peer basis. A cyclic communication services for parameterization, operation, monitoring, alarm/error handling and diagnostics of intelligent devices may be handled in parallel to cyclic transfer.

4.4 Function Block Parameters

Function block parameters can be read from the host or can be set. For a list of the parameters of blocks held by the FLXA21, refer to “3.6 PRIMARY/SECONDARY/TERTIARY/QUATERNARY_VALUE Value Assignment”. The following is a list of important parameters with a guide how to set them.

Outline

This chapter describes brief explanation of the AI function block.

Target Mode

The Target modes permitted for the AI function block are Automatic (Auto), Manual (Man), and Out of Service (O/S). When the Target mode of PB (Physical Block) is Out of Service (O/S), Actual is Out of Service (O/S) even if Automatic (Auto) or Manual (Man) is written to Target.

Actual mode

Many parameters require a change of the mode of the function block to O/S (Out of Service) when their data is changed. To change the mode of the function block, its Target Mode (TARGET_MODE) needs to be changed. The Actual Mode (MODE_BLK) is comprised of the three sub-parameters:

(1) Actual (Actual mode): Indicates the current operating condition.

(2) Permit (Permitted mode): Indicates the operating condition that the block is allowed to take.

(3) Normal (Normal mode): Indicates the operating condition that the block will usually take.

These mode parameter are very important as it gives the state of the block. In O/S (Out_Of_Service) mode the block is out of operation. In this mode it is allowed to update parameters. Manual mode gives the operator the possibility to manually update a selected number of parameters (values, scaling e.g.) in order to test the system. In automatic mode the function block is executed and block parameters are automatically updated.

Under normal operating circumstances, set the Auto mode for normal operation. Auto mode is the factory default.

NOTE

The actual mode is changed by setting the target mode. When the physical block mode is set to OOS all function blocks are set to OOS mode.

CHANNEL

Channel is the parameter to select the signal which is calculated in SENSOR Transducer Block. The values are assigned to channels.

For the FLXA21 three or four channels are available.

For the FLXA21, you can select from the PRIMARY, SECONDARY, TERTIARY, QUATENARY values assigned to the Transducer Block.

For details on how to assign measurement items to parameters, refer to “3.6 PRIMARY/SECONDARY/TERTIARY/QUATERNARY_VALUE Value Assignment”.

The following table shows the measurement items that you can select and their default values.

FLXA21-PH

Channel	Selectable TB value	Default	Selectable values
1	Primary Value	pH1	pH1, Temperature1, ORP1, rH1
2	Secondary Value	Temperature1	pH1, Temperature1, ORP1, rH1, Ref. impedance1, Empty
3	Tertiary Value	PH: Empty SENCOM: ORP1	
4	Quaternary Value	Empty	

FLXA21-SC

Channel	Selectable TB value	Default	Selectable values
1	Primary Value	Conduct1-TC1	Conduct1-TC1, Temperature1, Resist1-TC1, Concent1-TC1, Conduct1-TC2, Resist1-TC2, Concent1-TC2
2	Secondary Value	Temperature1	Conduct1-TC1, Temperature1, Resist1-TC1, Concent1-TC1, Conduct1-TC2, Resist1-TC2, Concent1-TC2, USP1, Empty
3	Tertiary Value	Empty	
4	Quaternary Value	Empty	

Fail Safe Mode

Fail Safe Mode defines the Output Value and Status (Quality) when status of input signal to AI function block or Totalizer function block is BAD.

This function is valid only when Actual Mode of AI function block is in “AUTO”

Output Value (OUT)

The function block parameter OUT contains the current measurement value in a vendor specific or configuration adjusted engineering unit and the belonging status in Auto Mode. Also contains the value and status set by an operator in Man Mode.

Simulation (SIMULATE)

Simulation parameter is to simulation mainly for checking arbitrarily set the value and input status from SENSROR Transducer block.

PV Scale (PV_SCALE)

Conversion of the process variable into percent using the high and low scale values.

Linearization type (LIN_TYPE)

Linearization type of output signal can be select from Linear or Square root. Linearization type of AI function block can apply to have different output mode for display and output signal. (For example, Display mode: Square root, Output mode: Linear)

Out Scale (OUT_SCALE)

Scale of the process variable. This parameter contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of process variable and the useful number of digits on the right hand side of the decimal point.

Filter Time Const (PV_FTIME)

Damping time of the process variable.

Fail Safe Mode (FSAFE_TYPE)

Fail Safe Mode is parameter used to define the reaction of the device, if a BAD status of signal to AI function block (OUT.Status and OUT.Value) is detected. This is available only when Target Mode of AI function block is in “Auto”.

Fail Safe Mode defines the Output Value and Status (Quality) when status of input signal to AI function block is BAD.

This function is valid only when Actual Mode of AI function block is in “AUTO”

Table 4.3 Fail Safe Mode (Classic Status)

Fail Safe Mode	Output Value and Status (Quality)	
Default value is used as output value	Value	Fail Safe Default value
	Status	UNCERTAIN - Substitute Value
Storing last valid output value	Value	Last stored valid OUT value
	Status	UNCERTAIN - Last Usable Value
The calculated output value is incorrect	Value	Wrong calculated value
	Status	BAD - *(* as calculated)

Table 4.4 Fail Safe Mode (Condensed Status)

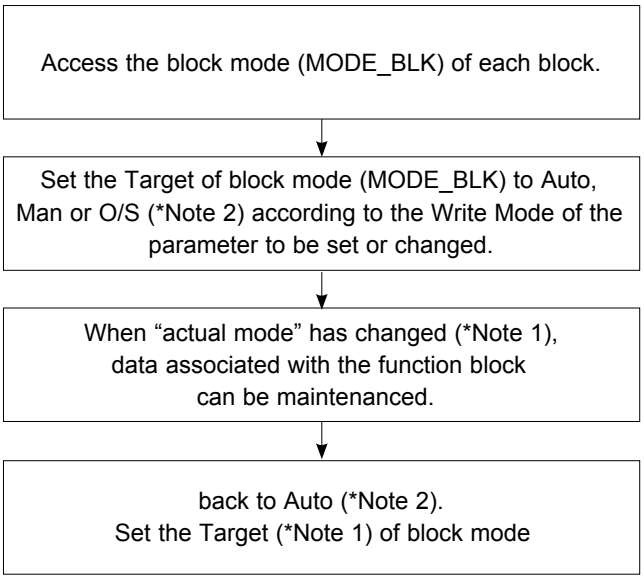
Fail Safe Mode	Output Value and Status (Quality)	
Default value is used as output value	Value	Fail Safe Default value
	Status	BAD - Passivated, Constant *1
		UNCERTAIN - Substitute Set *2
		UNCERTAIN - Process Related *3
		UNCERTAIN - Substitute Set *4
Storing last valid output value	Value	Last stored valid OUT value
	Status	BAD - Passivated, Constant *1
		UNCERTAIN - Substitute Set *2
		UNCERTAIN - Process Related *3
		UNCERTAIN - Substitute Set *4
The calculated output value is incorrect	Value	Wrong calculated value
	Status	BAD - Passivated, Constant *1
		BAD - Maintenance Alarm *2
		BAD - Process Related *3
		BAD -Function Check *4

*1: When input status = BAD - Passivated
*2: When input status = BAD - Maintenance Alarm
*3: When input status = BAD - Process Related
*4: When input status = BAD - Function Check

4.5 Setting and change of basic parameters

This section describes the procedure taken to set and change the parameters for each block. Obtaining access to each parameter differs depending on the configuration system used.

For details, refer to the instruction manual for each configuration system.



CAUTION

Do not turn the power of the device OFF immediately after parameter setting. When the parameters are saved to the EEPROM, the redundant processing is executed for an improvement of reliability. Should the power be turned OFF within 60 seconds after setting of parameters, changed parameters are not saved and may return to their original values.

Refer to the tables in Chapter 6 for details of the Write Mode for each block.

	AI Function Block	Transducer Block	Physical Block
Automatic (Auto)	Yes	Yes	Yes
Manual (Man)	Yes		
Out of Service (O/S)	Yes	Yes	Yes

4.6 Setting the AI Function Blocks

The AI function block is a unit of the software.

During execution, it incorporates data from the SENSOR transducer block. After execution, it updates analog outputs and processes newly generated alarms. AI function blocks can provide a discrete output which shows the status of LO, LO_LO, HI, or HI_HI. In terms of function, there is no difference between the three AI function blocks provided in FLXA21.

Function Blocks

The AI function block, via the Channel, incorporates analog signals from the transducer block, performs scaling processing, filtering, signal linearization, fail safe control and alarm processing before outputting. It has the function to generate a discrete output. Figure 4.1 presents the AI function block.

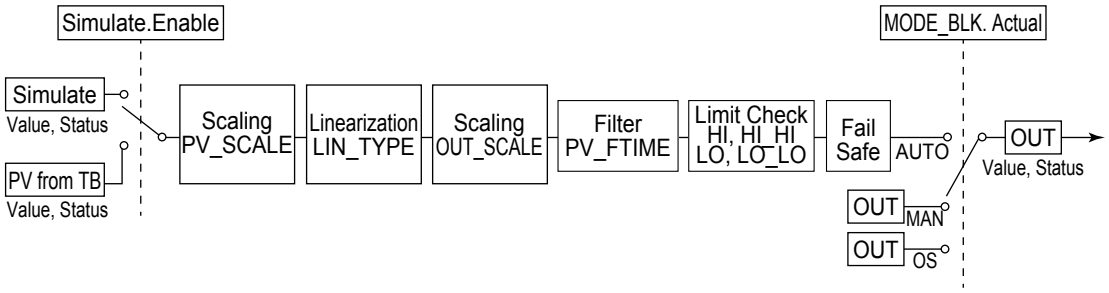


Figure 4.1 Diagram of the AI Functional Block

Setting the output scale

As explained in section 4.2.4 the OUT_SCALE can used to convert the channel's value to a different scale.

The default value is 0.0 to 100.0%.

Change this if necessary.

For AI1 set L_TYPE to Direct

With the FLXA21, the channel values are displayed on the display indicator, independent of the scaling in the AI blocks.

Setting the output mode

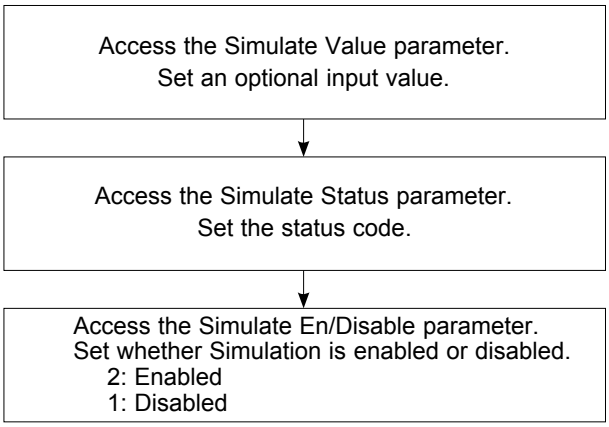
Access the L_TYPE parameter.	
Set the output mode.	
0: Direct	(no linearisation)
10: Square root	(Square root extraction output value)

Setting the damping time constant

Access the PV_FTIME parameter.
Set the damping time (in seconds).

Simulation

By optionally setting the input value to the calibration range and status, perform simulation of the AI function block.



If simulation is enabled, AI block uses Simulate Status and Simulate Value as the input, and if disabled, the AI block uses Transducer Status and Transducer Value as input.

Refer to “5.3 Simulation Function”.

5. In-Process Operation

This chapter describes the procedure performed when changing the operation of the function block of the analyzer in process.

5.1 Mode Transition

When the function block mode is changed to Out_Of_Service, the function block pauses.

When the function block mode is changed to Manual, the function block suspends updating of output values. In this case alone, it is possible to write a value to the OUT parameter of the block for output.

5.2 Generation of Alarm

■ Indication of Alarm

When the self-diagnostics function indicates that a device is faulty, a diagnostic message (DIAGNOSIS or DIAGNOSIS_EXTENSION) is issued from the physical block. When a diagnostic message is detected in each function block or a diagnostic message in the process value (process alarm) is detected, a diagnostic message is issued from each block.

For details of alarm, refer to "■ Device status" on page 6-14 .

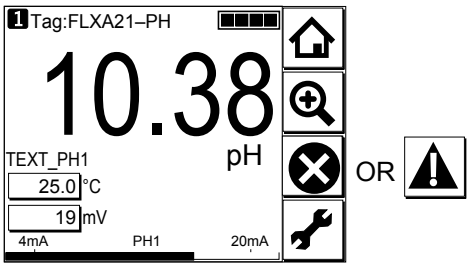


Figure 5.1 Example of alarm

■ Status of Each Parameter in Failure Mode

Status has Classic Status and Condensed Status.

Classic Status is a conventional alarm and does not support the NAMUR NE107. Condensed Status is an alarm which was added to PA Profile 3.01 or later and supports the NAMUR NE107.

The following standard categories of instrument diagnostics are defined for the NAMUR NE-107.

F (Failed):

An alarm category that indicates a failure has occurred in the instrument or in its peripheral devices.

C (Check Function):

An alarm category that indicates that a detected failure is a temporary event.

S (Off Specification):

An alarm category that indicates that the detected failure was caused by the instrument being used outside of its range or because a discrepancy has occurred between the set value and measured value. The alarm was caused either by the instrument or process state.

M (Maintenance):

An alarm category for a detected failure that has a low level of urgency but is a failure that could develop into a problem causing restrictions in instrument functionality in some environments.

Classic Status and Condensed Status can be switched by using the Condensed Status/ Diagnosis (PB.COND_STATUS_DIAG) parameter.

5.3 Simulation Function

It is possible to conduct testing for the downstream function blocks or alarm processes. Following description is how to use and how to set parameters of this function.

AI Function Blocks

When the parameters are set in the transducer block, it is necessary to set parameters as shown in Table 5.1 in the AI function blocks. When Simulate_Enabled in AI function blocks described at Table 5.1 is set to “1: Enabled”, the each AI function block that set this parameter uses the simulation value instead of the data from the transducer block.

Table 5.1 Simulation parameters in the AI block

Sub-Index	Parameters	Description	Valid Range	Initial Value
1	Simulate_Status	Set the data status to be simulated.	Unsigned 8	0
2	Simulate_Value	Set the value of the data to be simulated.	Float	0
3	Simulate_Enabled	Controls the simulation function of this block.	0: Disabled, 1: Enabled	0: Disabled

5.4 Write lock (Write-protect) function

The transmitter is provided with a write lock (write-protect) function to restrict write operations to blocks and prevent inadvertent writing of parameter data. To enable this function, use the write lock switch (Hard W Lock) or the WRITE_LOCKING (Physical block index 34) (Soft W Lock).

The CPU assembly of the transmitter is provided with a write lock switch (refer to Figure 2.3).

When the write lock switch is disabled, set 0 (protected) for WRITE_LOCKING (index 34) of the physical block to enable the write lock function.

These parameters and issue shall control the parameter access as defined in Table 5.2.

Table 5.2 Access protection

WRITE_LOCK Switch	Physical block DEVICE_STATUS_1	WRITE_LOCKING	Remote access possible
Off	Write Unlocked Bit is On	2457 (unprotected)	YES
—	—	0 (protected)	NO
On	Hard Write Lock Switch Bit is On.	—	NO

6. Function block parameters and Methods

Note for sections 6.1 to 6.3

The “Write Mode” column contains the modes in which each parameter is write enabled.

O/S: Write enabled in O/S mode.

MAN: Write enabled in Man mode and O/S mode.

AUTO: Write enabled in Auto mode, Man mode, and O/S mode.

RO: Read Only.

The “Initial Value” column contains initial values

—: Dynamic data or no description

Note for sections 6.4 and 6.5

—: Not exist

Note for section 6.6

The “Alarm/Status” column contains Fault or Warning.

—: No distinction of Fault and Warning.

The “TB .status” columns contains .statuses in TB generated by the alarms and the statuses in the “Alarm/Status” column.

—: Uninfluenced by the alarm and the status in the “Alarm/Status” column.

6.1 Physical Block Parameters

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
0	16	BLOCK_OBJECT	RO	—	Information on this block such as Profile, Profile Rev, etc.
1	17	ST_REV	RO	0	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
2	18	TAG_DESC	AUTO	Blank	The user description of the intended application of the block.
3	19	STRATEGY	AUTO	0	The strategy field can be used to identify grouping of block. This data is not checked or processed by the block.
4	20	ALERT_KEY	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	21	TARGET_MODE	AUTO	AUTO	Set the Target of block mode to Auto or O/S according to the write mode of the parameter to be set or changed.
6	22	MODE_BLK	RO	AUTO, AUTO | O/S, AUTO	The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode.
7	23	ALARM_SUM	RO	—	The current alarm status associated with the function block.
8	24	SOFTWARE_ REVISION	RO	“Rn.nn”	Revision number of the software of the field device.
9	25	HARDWARE_ REVISION	RO	“Sn.nn”	Revision number of the hardware of the field device.
10	26	DEVICE_MAN_ID	RO	“Yokogawa”	Identification code of the manufacturer of the field device.
11	27	DEVICE_ID	RO	FLXA21-PH: “FLXA21-PH” FLXA21-SC: “FLXA21-SC”	Manufacturer specific identification of the field device.
12	28	DEVICE_SER_ NUM	RO	Serial number	Serial number of field device.
13	29	DIAGNOSIS	RO	—	Detailed information of the devices, bitwise coded. More than one message possible at once.
14	30	DIAGNOSIS_ EXTENSION	RO	—	Additional manufacture-specific information of the device, bitwise coded.
15	31	DIAGNOSIS_ MASK	RO	—	Definition of supported DIAGNOSIS information-bits. Bit Off: not supported Bit On: supported
16	32	DIAGNOSIS_ MASK_ EXTENSION	RO	—	Definition of supported DIAGNOSIS_EXTENSION information-bits. Bit Off: not supported Bit On: supported
17	33	DEVICE_ CERTIFICATION	RO	—	Not used for the transmitter.
18	34	WRITE_LOCKING	AUTO	disabled	If set, no writes from anywhere are allowed, except for to clear write WRITE_LOCK. Block inputs will continue to be updated.
19	35	FACTORY_ RESET	AUTO	Factory Reset	Allows a manual restart to be initiated. Factory Reset (1) (Resetting device for default values. The Bus Address setting remains the same.) Warm start (2506) (Warm start of the device. All parameterization remains unchanged.) Reset Address to ‘126’ (2712) (Reset the Bus Address only.)
20	36	DESCRIPTOR	AUTO	“YOKOGAWA PROFIBUS-PA ANALYZER”	User definition text (a string) to describe the device within the application.
21	37	DEVICE_ MESSAGE	AUTO	Blank	User definable MESSAGE (a string) to describe the device within the application or in the plant.

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
22	38	DEVICE_INSTAL_DATE	AUTO	Blank	Date of installation of the device.
24	40	IDENT_NUMBER_SELECTOR	AUTO	Adaptation Mode	The parameter to select IDENT Number. Profile specific (0) Manufacturer specific (IDENT Number of DEVICE_ID) (1) Adaptation Mode (127)
26	42	FEATURE	RO	—	Indicates optional feature implemented in the device and the status of these features which indicates if the feature is supported or not supported.
27	43	COND_STATUS_DIAG	AUTO	Condensed Status and Diagnosis information is provided	Indicates the mode of a device that can be configured for stats and diagnostic behaviour. Status and Diagnosis (0) Condensed Status and Diagnosis information is provided (1)
36	52	DEVICE_CONFIGURATION	RO	Blank	Not used for FLXA21
37	53	INIT_STATE	AUTO	2	Not used for FLXA21
38	54	DEVICE_STATE	AUTO	2	Not used for FLXA21
39	55	GLOBAL_STATUS	RO	—	Not used for FLXA21
50	66	SOFT_DESC	RO	—	Yokogawa internal use only
51	67	DEVICE_STATUS_1	RO	—	Device status
52	68	DEVICE_STATUS_2	RO	—	Device status
53	69	DEVICE_STATUS_3	RO	—	Device status
54	70	DEVICE_STATUS_4	RO	—	Device status
55	71	DEVICE_STATUS_5	RO	—	Device status
56	72	DEVICE_STATUS_6	RO	—	Device status
57	73	DEVICE_STATUS_7	RO	—	Device status
58	74	DEVICE_STATUS_8	RO	—	Device status
59	75	IDENT_NUMBER	RO	—	IDENT Number of the device
70	86	PRIVATE_1	RO	—	Not used for the transmitter
71	87	PRIVATE_2	RO	—	Not used for the transmitter
72	88	PRIVATE_3	RO	—	Not used for the transmitter
73	89	PRIVATE_4	RO	—	Not used for the transmitter
74	90	PRIVATE_5	RO	—	Not used for the transmitter
75	91	PRIVATE_6	RO	—	Not used for the transmitter
76	92	PRIVATE_7	RO	—	Not used for the transmitter
77	93	PRIVATE_8	RO	—	Not used for the transmitter
78	94	PRIVATE_9	RO	—	Not used for the transmitter
79	95	PRIVATE_10	RO	—	Not used for the transmitter
80	96	PRIVATE_11	RO	—	Not used for the transmitter

6.2 Analog Input Block Parameters

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
0	16	BLOCK_OBJECT	RO	—	Information on this block such as Block Tag, DD Revision, Execution Time etc.
1	17	ST_REV	RO	0	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
2	18	TAG_DESC	AUTO	Blank	The user description of the intended application of the block.
3	19	STRATEGY	AUTO	0	The strategy field can be used to identify grouping of block. This data is not checked or processed by the block.
4	20	ALERT_KEY	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	21	TARGET_MODE	AUTO	AUTO	Set the Target of block mode (MODE_BLK) to Auto, Man or O/S according to the write Mode of the parameter to be set or changed.
6	22	MODE_BLK	RO	AUTO, AUTO | MAN | O/S, AUTO	The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode.
7	23	ALARM_SUM	RO	—	The current alarm status associated with the function block.
8	24	BATCH	AUTO	0,0,0,0	This parameter is intended to be used in Batch applications in line with IEC 61512.
10	26	OUT	MAN	—	This parameter contains the current measurement value from Transducer Block or configuration adjusted engineering unit and the belonging state in AUTO MODE. OUT contains the value and status set by an operator in MAN MODE.
11	27	PV_SCALE	O/S	100, 0	Conversion of the Process Variable into percent using the high and low scale value.
12	28	OUT_SCALE	O/S	100.0, 0.0, %, 1	Scale of the Process Variable. This parameter contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits to the right of the decimal point.
13	29	LIN_TYPE	O/S	No linearisation	Type of linearisation. No linearisation (0) Square root (10)
14	30	CHANNEL	O/S	AI1: Primary Value AI2: Secondary value AI3: Tertiary value	Reference to the active Transducer Block which provides the measurement value to the Function Blocks.
16	32	PV_FTIME	AUTO	0.000000	Time constant of a signal exponential filter for the PV, in seconds.
17	33	FSAFE_TYPE	AUTO	Storing last valid Output Value.	Defines reaction of device, if a fault is detected.
18	34	FSAFE_VALUE	AUTO	0.000000	Default value for the OUT parameter, if sensor or sensor electronic fault is detected. The unit of this parameter is the same as that for the OUT one.
19	35	ALARM_HYS	AUTO	0.5	Amount the PV must return within the alarm limits before the alarm condition clears. Alarm Hysteresis is expressed in engineering unit.
21	37	HI_HI_LIM	AUTO	+INFINITE	Value for upper limit alarms.
23	39	HI_LIM	AUTO	+INFINITE	Value for upper limit warnings.
25	41	LO_LIM	AUTO	-INFINITE	Value for lower limit warnings.
27	43	LO_LO_LIM	AUTO	-INFINITE	Value for lower limit alarms.
30	46	HI_HI_ALM	RO	—	State of the upper limit of alarms.
31	47	HI_ALM	RO	—	State of the upper limit of warnings.
32	48	LO_ALM	RO	—	State of the lower limit of warnings.
33	49	LO_LO_ALM	RO	—	State of the lower limit of alarms.
34	50	SIMULATE	AUTO	Disabled, 0.00, Bad	For commissioning and test purposes the input value from the Transducer Block in the Analog input Function Block AI-FB can be modified. That means that the Transducer and AI-FB will be disconnected.
35	51	OUT_UNIT_TEXT	AUTO	Blank	Available when PV_UNIT is “textual unit definition”.

6.3 Transducer block parameters

(1)Transducer block parameters FLXA21-PH

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
0	16	BLOCK_OBJECT	RO	—	Information on this block such as Block Tag, DD Revision, Execution Time etc.
1	17	ST_REV	RO	0	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed
2	18	TAG_DESC	AUTO	Blank	The user description of the intended application of the block.
3	19	STRATEGY	AUTO	0	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block
4	20	ALERT_KEY	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	21	TARGET_MODE	AUTO	AUTO	Set the Target of block mode (MODE_BLK) to Auto or O/S according to the write Mode of the parameter to be set or changed. The permitted bit is only available.
6	22	MODE_BLK	RO	AUTO, AUTO | O/S, AUTO	The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode
7	23	ALARM_SUM	RO	—	The current alarm status associated with the function block
8	24	COMPONENT_ NAME	O/S	Blank	Description of the measurement value as readable ASCII text.
9	25	PV	RO	—	Same as primary value.
10	26	PV_UNIT	O/S	pH	Unit of PV.
11	27	PV_UNIT_TEXT	O/S	Blank	Additional manufacturer specific engineering units.
12	28	ACTIVE_RANGE	O/S	RANGE_1	Number of the active range. Valid value is 1 only.
13	29	AUTORANGE_ON	O/S	TRUE	Valid value is "On" only.
14	30	SAMPLING_RATE	O/S	2500	Not used.
25	41	NUMBER_OF_ RANGE	RO	1	The number of ranges
26	42	RANGE_1	O/S	-3.402823E+038, 3.402823E+038	Not used
27	43	PRIMARY_ VALUE_TYPE	RO	pH	Item of Primary value.
28	44	PRIMARY_VALUE	RO	—	Primary value
29	45	PRIMARY_ VALUE_UNIT	RO	pH	Unit of Primary Value
30	46	SENSOR_TYPE_ PH	RO	pH Sensor (except for SENCOM)	Type of pH sensor. On SENCOM value depends on sensor.
31	47	PH_ZERO1	O/S	0.000	Calibrated sensor offset of pH.
32	48	PH_ZERO2	RO	0.000	Calibrated secondary sensor offset of pH. Only available after 3 points calibration
33	49	PH_ZERO_UNIT	RO	mV	Unit of PH_ZERO1/2
34	50	PH_SLOPE1	O/S	100.0	Calibrated efficiency of pH sensor.
35	51	PH_SLOPE2	RO	100.0	Calibrated secondary efficiency of pH sensor. Only available after 3 points calibration.
36	52	PH_SLOPE_UNIT	RO	%	Unit of PH_SLOPE1/2
37	53	PH_3POINT_ CALIBRATION	RO	disabled	Method of executed 3 points calibration.
38	54	ISOPOTENTIAL_ PH	RO	7.00	Isothermal point of pH calculation
39	55	SENSOR_ CALIBRATION_ DATE	RO	0000/01/01 0:00:00	Date on which the last sensor calibration was performed.
40	56	SENSOR_ CALIBRATION_ DUE_DATE	RO	0000/01/01 0:00:00	Date when the calibration must be done next.
41	57	SENSOR_TEMP_ COMPENSATION	O/S	Automatic	Temperature compensation method of the Nernst equation.
42	58	SENSOR_TEMP_ MANUAL_VALUE	O/S	25.0	Temperature used on the Nernst equation when temperature compensation method is Manual.

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
43	59	REFERENCE_ TEMP	O/S	25.0	Temperature to which the measured pH value must be compensated.
44	60	PROCESS_ TEMP_ COMPENSATION	O/S	None	Method of process temperature compensation.
45	61	PH_TEMP_ COEFFICIENT	O/S	0.000000	Coefficient of TC (Linear compensation function)
46	62	SECONDARY_ VALUE_TYPE	RO	temperature	Item of Secondary value.
47	63	SECONDARY_ VALUE	RO	—	Secondary value.
48	64	SECONDARY_ VALUE_UNIT	RO	degC	Unit of secondary value
49	65	SENSOR_TYPE_ TEMP	RO	Pt1000	Temperature sensor
50	66	TEMP_UNIT	RO	degC	Unit of temperature
51	67	TERTIARY_ VALUE_TYPE	RO	Empty	Item of Tertiary value
52	68	TERTIARY_ VALUE	RO	—	Tertiary value
53	69	TERTIARY_ VALUE_UNIT	RO	none	Unit of Tertiary value
54	70	ORP_ZERO	O/S	0.000	Calculated sensor offset of ORP
55	71	ORP_SLOPE	RO	1000.0	Calibrated efficiency of ORP sensor.
56	72	QUATERNARY_ VALUE_TYPE	RO	Empty	Item of Quaternary value
57	73	QUATERNARY_ VALUE	RO	—	Quaternary value
58	74	QUATERNARY_ VALUE_UNIT	RO	none	Unit of Quaternary value
59	75	SENSOR_MV	RO	—	Voltage from sensor.
60	76	ORP_SENSOR_ MV	RO	—	Voltage from sensor for ORP.
61	77	IMPEDANCE1	RO	—	Electrical resistance of Input1.
62	78	IMPEDANCE2	RO	—	Electrical resistance of Input2.
63	79	DETC_ WELLNESS_ ZERO	RO	—	Sensor wellness indicator by Zero value.
64	80	DETC_ WELLNESS_ SLOPE	RO	—	Sensor wellness indicator by Slope value.
65	81	DETC_ WELLNESS_ IMPEDANCE1	RO	—	Sensor wellness indicator by Input1's impedance.
66	82	DETC_ WELLNESS_ IMPEDANCE2	RO	—	Sensor wellness indicator by Input1's impedance.
67	83	DETC_ WELLNESS_ HEAT_CYCLE	RO	—	Sensor wellness indicator by heat cycle.
68	84	DETC_ WELLNESS_ PROG_TIME	RO	—	Sensor wellness indicator by elapsed time.
69	85	MODULE_PDN	RO	Product no.	Product number of Sensor module.
70	86	MODULE_ SOFTREV	RO	"Rn.nn"	Software revision of Sensor module.
71	87	HOUSING_PDN	RO	Product no.	Product number of Housing module.
72	88	HOUSING_ SOFTREV	RO	“Rn.nn”	Software revision of Housing module.
73	89	SENSOR_TYPE_ MODEL	RO	—	Analog (1), SENCOM (2)
74	90	SENCOM_MAX_ TEMP	RO	—	Max temperature sensor has been exposed. Available on SENCOM.
75	91	SENCOM_HIGH_ PH_TOTAL	RO	—	Total time during which pH value has been higher than upper limit. Available on SENCOM.
76	92	SENCOM_LOW_ PH_TOTAL	RO	—	Total time during which pH value has been higher than upper limit. Available on SENCOM.
77	93	SENCOM_ STERILIZATION	RO	—	Number of heat sterilization judged by preset temperature and time. Available on SENCOM.

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
78	94	SENCOM_ STERILIZATION_ LAST_DATE	RO	0000/01/01 0:00:00	The last date of heat sterilization judged by preset temperature and time. Available on SENCOM.
79	95	SENCOM_HIGH_ TEMP1_TOTAL	RO	0	Total time during which temperature has been higher than preset temperature 1. Available on SENCOM.
80	96	SENCOM_HIGH_ TEMP1_LAST_ DATE	RO	0000/01/01 0:00:00	The last date when temperature has been higher than preset temperature 1. Available on SENCOM.
81	97	SENCOM_HIGH_ TEMP2_TOTAL	RO	0	Total time during which temperature has been higher than preset temperature 2. Available on SENCOM.
82	98	SENCOM_HIGH_ TEMP2_LAST_ DATE	RO	0000/01/01 0:00:00	The last date when temperature has been higher than preset temperature 2. Available on SENCOM.
83	99	SENCOM_ MODEL_CODE	RO	—	Model code of SENCOM sensor. Available on SENCOM.
84	100	SENCOM_ SOFTREV	RO	“Rn.nn”	Software revision of SENCOM sensor. Available on SENCOM
85	101	SENCOM_ ASSYREV	RO	“Rn.nn”	Assembly revision of SENCOM sensor. Available on SENCOM.
86	102	SENCOM_ SERIAL_NO	RO	Serial no.	Serial number of SENCOM sensor. Available on SENCOM.
87	103	SENCOM_FACT_ DATE	RO	—	Manufacturing date of SENCOM sensor. Available on SENCOM.
88	104	ERR_CONFIG_ PH_TOO_HIGH	O/S	Warning	Category of error status(Fault/Warning/Off)
89	105	ERR_CONFIG_ PH_TOO_LOW	O/S	Warning	Category of error status(Fault/Warning/Off)
90	106	ERR_CONFIG_ TEMP_TOO_ HIGH	O/S	Warning	Category of error status(Fault/Warning/Off)
91	107	ERR_CONFIG_ TEMP_TOO_LOW	O/S	Warning	Category of error status(Fault/Warning/Off)
92	108	ERR_CONFIG_ ORP_TOO_HIGH	O/S	Off	Category of error status(Fault/Warning/Off)
93	109	ERR_CONFIG_ ORP_TOO_LOW	O/S	Off	Category of error status(Fault/Warning/Off)
94	110	ERR_CONFIG_ RH_TOO_HIGH	O/S	Off	Category of error status(Fault/Warning/Off)
95	111	ERR_CONFIG_ RH_TOO_LOW	O/S	Off	Category of error status(Fault/Warning/Off)
96	112	ERR_CONFIG_ MATRIX_ CONFIG_ERROR	O/S	Fault	Category of error status(Fault/Warning/Off)
97	113	ERR_CONFIG_ CALIB_TIME_ EXCEEDED	O/S	Off	Category of error status(Fault/Warning/Off)
98	114	ERR_CONFIG_ IMPEDANCE1_ TOO_HIGH	O/S	Off	Category of error status(Fault/Warning/Off)
99	115	ERR_CONFIG_ IMPEDANCE1_ TOO_LOW	O/S	Warning	Category of error status(Fault/Warning/Off)
100	116	ERR_CONFIG_ IMPEDANCE2_ TOO_HIGH	O/S	Warning	Category of error status(Fault/Warning/Off)
101	117	ERR_CONFIG_ IMPEDANCE2_ TOO_LOW	O/S	Off	Category of error status(Warning/Off) Available on SENCOM.
102	118	ERR_CONFIG_ SENCOM_ SENSOR_ CHANGED	O/S	Off	Category of error status(Fault/Warning/Off) Available on SENCOM.
103	119	IMPEDANCE1_ LOW_LMT	O/S	1000.0	Low limit of Input 1 impedance.
104	120	IMPEDANCE1_ HIGH_LMT	O/S	200000.0	High limit of Input 1 impedance.

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
105	121	IMPEDANCE2_ LOW_LMT	O/S	1000.0	Low limit of Input 2 impedance.
106	122	IMPEDANCE2_ HIGH_LMT	O/S	200000.0	High limit of Input 2 impedance.
107	123	DIAG_SETTING_ IMPEDANCE1	O/S	Disable	Enable or Disable of sensor wellness by input1 impedance.
108	124	DIAG_SETTING_ IMPEDANCE1_ FINE	O/S	10000000.0	Limit for diagnostic when input1 impedance method set to High.
109	125	DIAG_SETTING_ IMPEDANCE2	O/S	Disable	Enable or disable of sensor wellness by input2 impedance.
110	126	DIAG_SETTING_ IMPEDANCE2_ FINE	O/S	10000000.0	Limit for diagnostic when input2 impedance method set to High.
111	127	DIAG_SETTING_ PROG_TIME	O/S	Disable	Enable or Disable of sensor wellness by elapsed time.
112	128	DIAG_SETTING_ PROG_TIME_ BAD_LMT	O/S	2000	Limit for sensor wellness by elapsed time.
113	129	DIAG_SETTING_ HEAT_CYCLE	O/S	Disable	Enable or Disable of sensor wellness by heat cycle.
114	130	DIAG_SETTING_ HEAT_CYCLE_ BAD_LMT	O/S	500	Limit for sensor wellness by heat cycle.
115	131	HEAT_CYCLE_ TEMP	O/S	50	Limit of temperature for sensor wellness by heat cycle.
116	132	HEAT_CYCLE_ TIME	O/S	10.0	Limit of time for sensor wellness by heat cycle.
117	133	SENCOM_ STERILIZATION_ TEMP	O/S	155.0	Limit temperature for checking sterilization.
118	134	SENCOM_ STERILIZATION_ TIME	O/S	100.0	Limit time for checking sterilization.
119	135	SENCOM_HIGH_ TEMP1	O/S	155.0	Limit value for checking high temperature 1.
120	136	SENCOM_HIGH_ TEMP2	O/S	155.0	Limit value for checking high temperature 2.
121	137	SENCOM_LOW_ PH	O/S	1.0	Limit value for checking low pH.
122	138	SENCOM_HIGH_ PH	O/S	13.0	Limit value for checking high pH.
123	139	TRANSMITTER_ TIME	O/S	—	Time of Housing module.
144	160	TEST_1	—	—	Used by a vender's serviceperson DTM doesn't support them.
145	161	TEST_2	—	—	
146	162	TEST_3	—	—	
147	163	TEST_4	—	—	
148	164	TEST_5	—	—	
149	165	TEST_6	—	—	
150	166	TEST_7	—	—	
151	167	TEST_8	—	—	
152	168	TEST_9	—	—	

(2)Transducer block parameters FLXA21-SC

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
0	16	BLOCK_OBJECT	RO	—	Information on this block such as Block Tag, DD Revision, Execution Time etc.
1	17	ST_REV	RO	0	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed
2	18	TAG_DESC	AUTO	Blank	The user description of the intended application of the block.
3	19	STRATEGY	AUTO	0	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block
4	20	ALERT_KEY	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	21	TARGET_MODE	AUTO	AUTO	Set the Target of block mode (MODE_BLK) to Auto or O/S according to the write Mode of the parameter to be set or changed. The permitted bit is only available.
6	22	MODE_BLK	RO	AUTO, AUTO | O/S, AUTO	The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode
7	23	ALARM_SUM	RO	—	The current alarm status associated with the function block
8	24	COMPONENT_ NAME	O/S	Blank	Description of the measurement value as readable ASCII text.
9	25	PV	RO	—	Same as primary value.
10	26	PV_UNIT	O/S	S/cm	Unit of PV.
11	27	PV_UNIT_TEXT	O/S	Blank	Additional manufacturer specific engineering units.
12	28	ACTIVE_RANGE	O/S	RANGE_1	Number of the active range. Valid value is 1 only.
13	29	AUTORANGE_ON	O/S	TRUE	Valid value is "On" only.
14	30	SAMPLING_RATE	O/S	2500	Not used.
25	41	NUMBER_OF_ RANGE	RO	1	The number of ranges
26	42	RANGE_1	O/S	-3.4+038, 3.4+038	Not used
27	43	PRIMARY_ VALUE_TYPE	RO	Conductivity1-TC1	Item of Primary value.
28	44	PRIMARY_VALUE	RO	—	Primary value
29	45	PRIMARY_ VALUE_UNIT	RO	S/cm	Unit of Primary Value
30	46	SENSOR_TYPE_ SC	RO	2 electrode	Sensor type
31	47	CELL_CONST_ FACTORY	RO	0.10	Cell constant(factory setting).
32	48	CELL_CONST_ ADJUST	RO	0.10	Cell constant(adjusted)
33	49	MEASURING_ TYPE	RO	Conductivity	Measuring type.
34	50	MEASURING_ UNIT	RO	/cm	Measuring unit
35	51	SENSOR_ CALIBRATION_ DATE	RO	0000/01/01 0:00:00	Date on which the last sensor calibration was performed.
36	52	SENSOR_ CALIBRATION_ DUE_DATE	RO	0000/01/01 0:00:00	Date when the calibration must be done next.
37	53	SENSOR_TEMP_ COMPENSATION	O/S	Automatic	Temperature compensation method.
38	54	SENSOR_TEMP_ MANUAL_VALUE	O/S	25.0	Temperature used when temperature compensation method is Manual.
39	55	REFERENCE_ TEMP	O/S	25.0	Temperature to which the measured value must be compensated.
40	56	TEMP_ COMPENSATION1	O/S	NaCl	Temperature compensation method 1
41	57	TEMP_ COMPENSATION2	O/S	None	Temperature compensation method 2
42	58	TEMP_ COEFFICIENT1	O/S	2.10	Available on TEMP_COMPENSATION1 being TC.

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
43	59	TEMP_ COEFFICIENT2	O/S	2.10	Available on TEMP_COMPENSATION2 being TC.
44	60	SECONDARY_ VALUE_TYPE	RO	Temperature	Item of Secondary value.
45	61	SECONDARY_ VALUE	RO	—	Secondary value.
46	62	SECONDARY_ VALUE_UNIT	RO	degC	Unit of secondary value
47	63	SENSOR_TYPE_ TEMP	RO	Pt1000	Temperature sensor
48	64	TEMP_UNIT	RO	degC	Unit of temperature
49	65	TERTIARY_ VALUE_TYPE	RO	Empty	Item of Tertiary value
50	66	TERTIARY_ VALUE	RO	—	Tertiary value
51	67	TERTIARY_ VALUE_UNIT	RO	none	Unit of Tertiary value
52	68	QUATERNARY_ VALUE_TYPE	RO	Empty	Item of Quaternary value
53	69	QUATERNARY_ VALUE	RO	—	Quaternary value
54	70	QUATERNARY_ VALUE_UNIT	RO	none	Unit of Quaternary value
55	71	CONC_ ADDITIONAL_ TABLE	O/S	Disabled	Disable means that the concentration can be obtained from the temperature compensation matrix. Enable means that the concentration can be obtained from additional concentration table.
56	72	CONC_UNIT	O/S	%	Unit of concentration.
57	73	CONC_TABLE_ CONCENTRATION_1	O/S	NOT A NUMBER	Concentration 1 in the additional concentration table.
58	74	CONC_TABLE_ CONCENTRATION_2	O/S	NOT A NUMBER	Concentration 2 in the additional concentration table.
59	75	CONC_TABLE_ CONCENTRATION_3	O/S	NOT A NUMBER	Concentration 3 in the additional concentration table.
60	76	CONC_TABLE_ CONCENTRATION_4	O/S	NOT A NUMBER	Concentration 4 in the additional concentration table.
61	77	CONC_TABLE_ CONCENTRATION_5	O/S	NOT A NUMBER	Concentration 5 in the additional concentration table.
62	78	CONC_TABLE_ CONCENTRATION_6	O/S	NOT A NUMBER	Concentration 6 in the additional concentration table.
63	79	CONC_TABLE_ CONCENTRATION_7	O/S	NOT A NUMBER	Concentration 7 in the additional concentration table.
64	80	CONC_TABLE_ CONCENTRATION_8	O/S	NOT A NUMBER	Concentration 8 in the additional concentration table.
65	81	CONC_TABLE_ CONCENTRATION_9	O/S	NOT A NUMBER	Concentration 9 in the additional concentration table.
66	82	CONC_TABLE_ CONCENTRATION_10	O/S	NOT A NUMBER	Concentration 10 in the additional concentration table.
67	83	CONC_TABLE_ CONCENTRATION_11	O/S	NOT A NUMBER	Concentration 11 in the additional concentration table.
68	84	CONC_TABLE_ CONCENTRATION_12	O/S	NOT A NUMBER	Concentration 12 in the additional concentration table.
69	85	CONC_TABLE_ CONCENTRATION_13	O/S	NOT A NUMBER	Concentration 13 in the additional concentration table.
70	86	CONC_TABLE_ CONCENTRATION_14	O/S	NOT A NUMBER	Concentration 14 in the additional concentration table.
71	87	CONC_TABLE_ CONCENTRATION_15	O/S	NOT A NUMBER	Concentration 15 in the additional concentration table.
72	88	CONC_TABLE_ CONCENTRATION_16	O/S	NOT A NUMBER	Concentration 16 in the additional concentration table.
73	89	CONC_TABLE_ CONCENTRATION_17	O/S	NOT A NUMBER	Concentration 17 in the additional concentration table.
74	90	CONC_TABLE_ CONCENTRATION_18	O/S	NOT A NUMBER	Concentration 18 in the additional concentration table.
75	91	CONC_TABLE_ CONCENTRATION_19	O/S	NOT A NUMBER	Concentration 19 in the additional concentration table.
76	92	CONC_TABLE_ CONCENTRATION_20	O/S	NOT A NUMBER	Concentration 20 in the additional concentration table.
77	93	CONC_TABLE_ CONCENTRATION_21	O/S	NOT A NUMBER	Concentration 21 in the additional concentration table.

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
78	94	CONC_TABLE_ CONDUCTIVITY_1	O/S	NOT A NUMBER	Conductivity 1 in the additional concentration table.
79	95	CONC_TABLE_ CONDUCTIVITY_2	O/S	NOT A NUMBER	Conductivity 2 in the additional concentration table.
80	96	CONC_TABLE_ CONDUCTIVITY_3	O/S	NOT A NUMBER	Conductivity 3 in the additional concentration table.
81	97	CONC_TABLE_ CONDUCTIVITY_4	O/S	NOT A NUMBER	Conductivity 4 in the additional concentration table.
82	98	CONC_TABLE_ CONDUCTIVITY_5	O/S	NOT A NUMBER	Conductivity 5 in the additional concentration table.
83	99	CONC_TABLE_ CONDUCTIVITY_6	O/S	NOT A NUMBER	Conductivity 6 in the additional concentration table.
84	100	CONC_TABLE_ CONDUCTIVITY_7	O/S	NOT A NUMBER	Conductivity 7 in the additional concentration table.
85	101	CONC_TABLE_ CONDUCTIVITY_8	O/S	NOT A NUMBER	Conductivity 8 in the additional concentration table.
86	102	CONC_TABLE_ CONDUCTIVITY_9	O/S	NOT A NUMBER	Conductivity 9 in the additional concentration table.
87	103	CONC_TABLE_ CONDUCTIVITY_10	O/S	NOT A NUMBER	Conductivity 10 in the additional concentration table.
88	104	CONC_TABLE_ CONDUCTIVITY_11	O/S	NOT A NUMBER	Conductivity 11 in the additional concentration table.
89	105	CONC_TABLE_ CONDUCTIVITY_12	O/S	NOT A NUMBER	Conductivity 12 in the additional concentration table.
90	106	CONC_TABLE_ CONDUCTIVITY_13	O/S	NOT A NUMBER	Conductivity 13 in the additional concentration table.
91	107	CONC_TABLE_ CONDUCTIVITY_14	O/S	NOT A NUMBER	Conductivity 14 in the additional concentration table.
92	108	CONC_TABLE_ CONDUCTIVITY_15	O/S	NOT A NUMBER	Conductivity 15 in the additional concentration table.
93	109	CONC_TABLE_ CONDUCTIVITY_16	O/S	NOT A NUMBER	Conductivity 16 in the additional concentration table.
94	110	CONC_TABLE_ CONDUCTIVITY_17	O/S	NOT A NUMBER	Conductivity 17 in the additional concentration table.
95	111	CONC_TABLE_ CONDUCTIVITY_18	O/S	NOT A NUMBER	Conductivity 18 in the additional concentration table.
96	112	CONC_TABLE_ CONDUCTIVITY_19	O/S	NOT A NUMBER	Conductivity 19 in the additional concentration table.
97	113	CONC_TABLE_ CONDUCTIVITY_20	O/S	NOT A NUMBER	Conductivity 20 in the additional concentration table.
98	114	CONC_TABLE_ CONDUCTIVITY_21	O/S	NOT A NUMBER	Conductivity 21 in the additional concentration table.
99	115	POLARIZATION	RO	—	Degree of polarization of the sensor.
100	116	SENSOR_OHMS	RO	—	Non-compensated resistance of the sensor.
101	117	USP	RO	—	Margin of safety for the water for injection defined by USP<645>.
102	118	DETC_ WELLNESS_ POLARIZATION	RO	—	Sensor wellness indicator by Polarization.
103	119	DETC_ WELLNESS_ CELL_CONST	RO	—	Sensor wellness indicator by Cell Constant.
104	120	DETC_ WELLNESS_ HEAT_CYCLE	RO	—	Sensor wellness indicator by heat cycle.
105	121	DETC_ WELLNESS_ PROG_TIME	RO	—	Sensor wellness indicator by elapsed time.
106	122	MODULE_PDN	RO	Production no.	Product number of Sensor module.
107	123	MODULE_ SOFTREV	—	"Rn.nn"	Software revision of Sensor module.
108	124	HOUSING_PDN	RO	Production no.	Product number of Housing module.
109	125	HOUSING_ SOFTREV	—	“Rn.nn”	Software revision of Housing module.
110	126	ERR_CONFIG_ COND_OR_ CONC_TOO_ HIGH	O/S	Warning	Category of error status(Fault/Warning/Off)

Relative Index	Index	Parameter	Write Mode	Initial Value	Explanation
111	127	ERR_CONFIG_ COND_OR_ CONC_TOO_ LOW	O/S	Warning	Category of error status(Fault/Warning/Off)
112	128	ERR_CONFIG_ TEMP_TOO_ HIGH	O/S	Warning	Category of error status(Fault/Warning/Off)
113	129	ERR_CONFIG_ TEMP_TOO_LOW	O/S	Warning	Category of error status(Fault/Warning/Off)
114	130	ERR_CONFIG_ POLARIZATION_ DETECT	O/S	Warning	Category of error status(Fault/Warning/Off)
115	131	ERR_CONFIG_ CALIB_TIME_ EXCEEDED	O/S	Off	Category of error status(Fault/Warning/Off)
116	132	ERR_CONFIG_ USP_LMT_ EXCEED	O/S	Off	Category of error status(Fault/Warning/Off)
118	134	ERR_ CONFIG_1ST_ COMP_MATRIX	O/S	Fault	Category of error status(Fault/Warning/Off)
119	135	ERR_ CONFIG_2ND_ COMP_MATRIX	O/S	Fault	Category of error status(Fault/Warning/Off)
120	136	ERR_CONFIG_ CONC_TABLE	O/S	Fault	Category of error status(Fault/Warning/Off)
121	137	MEASUREMENT_ HIGH_LMT	O/S	0.250	High limit for checking "Conductivity too high" or low limit for checking "Resistivity too low".
122	138	MEASUREMENT_ LOW_LMT	O/S	0.000001	Low limit for checking "Conductivity too low" or high limit for checking "Resistivity too high".
123	139	USP_SAFETY_ MARGIN	O/S	0.000	Percentage of the limit value of USP<645> serves as a safety margin.
124	140	DIAG_SETTING_ PROG_TIME	O/S	Disable	Enable or Disable of sensor wellness by elapsed time.
125	141	DIAG_SETTING_ PROG_TIME_ BAD_LMT	O/S	2000	Limit for sensor wellness by elapsed time.
126	142	DIAG_SETTING_ HEAT_CYCLE	O/S	Disable	Enable or Disable of sensor wellness by heat cycle.
127	143	DIAG_SETTING_ HEAT_CYCLE_ BAD_LMT	O/S	500	Limit for sensor wellness by heat cycle.
128	144	HEAT_CYCLE_ TEMP	O/S	50	Limit of temperature for sensor wellness by heat cycle.
129	145	HEAT_CYCLE_ TIME	O/S	10.0	Limit of time for sensor wellness by heat cycle.
130	146	TRANSMITTER_ TIME	O/S	—	Time of Housing module.
144	160	TEST_1	—	—	Used by a vender's serviceperson DTM doesn't support them.
145	161	TEST_2	—	—	
146	162	TEST_3	—	—	
147	163	TEST_4	—	—	
148	164	TEST_5	—	—	
149	165	TEST_6	—	—	
150	166	TEST_7	—	—	
151	167	TEST_8	—	—	
152	168	TEST_9	—	—	

6.4 Diagnostic Information

■ DIAGNOSIS

Diagnostic information and failures are indicated by using parameter Diagnosis and Diagnosis Extension in the Physical Block.

DIAGNOSIS has Classic DIAGNOSIS and Condensed DIAGNOSIS. Classic DIAGNOSIS is a conventional alarm and does not support the NAMUR NE107. Condensed DIAGNOSIS is an alarm which was added to PA Profile 3.01 or later and supports the NAMUR NE107. For switching the two statuses, refer to "■ Status of Each Parameter in Failure Mode" on page 5-1.

Contents of condensed DIAGNOSIS and classic DIAGNOSIS are listed in Table 6.1 and 6.2.

Table 6.1 Contents of Condensed DIAGNOSIS

Octet	Bit	DIAGNOSIS Mnemonic	Description	Remarks	NAMUR NE107 Category
1	0-7	Reserved *2	Reserved for use within the PNO	—	—
2	0-3	Reserved *2	Reserved for use within the PNO	—	—
	3	DIA_WARMSTART *1	New start-up (warm startup) carried out.	Should be set after power-on or after FACTORY_RESET = 2506 has been executed.	—
	4	DIA_COLDSTART *1	Restart (cold startup) carried out.	Should be set after FACTORY_RESET = 1 has been executed.	—
	5	DIA_MAINTENANCE *2	Maintenance required	—	M
	6	Reserved *2	Reserved for use within the PNO	—	—
	7	IDENT_NUMBER_ VIOLATION *2	Set to 1 (one), if the IDENT_ Number of the running cyclic data transfer and the value of Physical Block IDENT_ NUMBER_SELECTOR parameter do not correspond. If IDENT_NUMBER_ SELECTOR = 127 (adaption mode) then the DIAGNOSIS bit IDENT_NUMBER_VIOLATION is cleared / not set.	—	C
3	0	DIA_MAINTENANCE_ ALARM	Failure of the device or armature	Refer to Table of Device status.	F
	1	DIA_MAINTENANCE_ DEMANDED *2	Maintenance demanded	Refer to Table of Device status.	M
	2	DIA_FUNCTION_ CHECK	Device is in function check mode or in simulation or under local control e.g. maintenance	Refer to Table of Device status.	C
	3	DIA_INV_PRO_COND	The process conditions do not allow to return valid values. (Set if a value has the quality Uncertain - Process related, no maintenance or Bad - Process related, no maintenance	Refer to Table of Device status.	S
	4-7	Reserved *2	Reserved for use within the PNO	—	—
4	0-6	Reserved *2	Reserved for use within the PNO	—	—
	7	EXTENSION_ AVAILABLE	0: There is no more information available 1: More diagnosis information is available in DIAGNOSIS_ EXTENSION	—	—

*1: This bit is Off 10 seconds after On.
*2: Not available for FLXA21.

Table 6.2 Contents of Classic DIAGNOSIS

Octet	Bit	DIAGNOSIS Mnemonic	Description	Remarks
1	0	DIA_HW_ELECTR	Hardware failure of the electronic	Refer to Table of Device status.
	1	DIA_HW_MECH	Hardware failure mechanics	Refer to Table of Device status.
	2	DIA_TEMP_MOTOR *2	Motor- temperature too high	
	3	DIA_TEMP_ELECTR *2	Electronic temperature too high	
	4	DIA_MEM_CHKSUM	Memory error	Refer to Table of Device status.
	5	DIA_MEASUREMENT *2	Failure in measurement	—
	6	DIA_NOT_INIT *2	Device not initialized (No self calibration)	—
	7	DIA_INIT_ERR *2	Self calibration failed	—
2	0	DIA_ZERO_ERR	Zero point error (limit position)	Refer to Table of Device status.
	1	DIA_SUPPLY *2	Power supply failed (electrical, pneumatic)	—
	2	DIA_CONF_INVAL *2	Configuration not valid	—
	3	DIA_WARMSTART *1	New start-up (warm startup) carried out.	Should be set after power-on or after FACTORY_RESET = 2506 has been executed.
	4	DIA_COLDSTART *1	Restart (cold startup) carried out.	Should be set after FACTORY_RESET = 1 has been executed.
	5	DIA_MAINTAINANCE *2	Maintenance required	—
	6	DIA_CHARACT *2	Characterization invalid	—
	7	IDENT_NUMBER_ VIOLATION *2	Set to 1 (one), if the IDENT_Number of the running cyclic data transfer and the value of Physical Block IDENT_ NUMBER_SELECTOR parameter do not correspond. If IDENT_NUMBER_ SELECTOR = 127 (adaption mode) then the DIAGNOSIS bit IDENT_NUMBER_ VIOLATION is cleared / not set.	—
3	0-7	Reserved *2	Reserved for use within the PNO	—
4	0-6	Reserved *2	Reserved for use within the PNO	—
	7	EXTENSION_AVAILABLE	More diagnosis information is available	—

*1: This bit is Off 10 seconds after On.
*2: Not available for FLXA21.

Device status

Device setting status and failures of FLXA21 are indicated by using parameter DEVICE_ STATUS_1, DEVICE_STATUS_2, DEVICE_STATUS_3, DEVICE_STATUS_4, DEVICE_ STATUS_5, DEVICE_STATUS_6, DEVICE_STATUS_7 and DEVICE_STATUS_8 (index 51, 52, 53, 54, 55, 56, 57 and 58) in Physical Block.

FLXA21-PH

DEVICE_STATUS_1: Table 6.3
DEVICE_STATUS_2: Table 6.4
DEVICE_STATUS_3: Table 6.5
DEVICE_STATUS_4: Table 6.6
DEVICE_STATUS_5: Table 6.7
DEVICE_STATUS_6: Table 6.8
DEVICE_STATUS_7: Not used.
DEVICE_STATUS_8: Table 6.9

Table 6.3 DEVICE_STATUS_1

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Write Unlocked	Writing to parameters is Unlocked. Change the PB Write Lock(PB. WRITE_LOCK) to Locked or turn on the hardware write lock switch.	—	—	—	—
Hard Write Lock SW OFF	Hardware write lock switch is OFF. Turn on the hardware write lock switch.	—	—	—	—
Write Locked	Writing to parameters is locked. Change the PB Write Lock(PB. WRITE_LOCK) to Locked or turn off the hardware write lock switch.	—	—	—	—
Hard Write Lock SW OFF	Hardware write lock switch is ON. Turn off the hardware write lock switch.	—	—	—	—
Abnormal Boot Process	Abnormal boot processing was detected at the starting. Check the cables and power.	F	—	Failure of the device or armature	—
PB in O/S Mode (AL.40)	Physical Block is in O/S mode. Change the PB Block Mode. Target(PB.TARGET_MODE) to Auto mode.	F	—	—	Function Block Mode Check
AMP Module Failure2 (AL.02)	Amplifier EEPROM failed. Replace electrical parts such as the amplifier. Or replace the device.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure

Table 6.4 DEVICE_STATUS_2 (System Fault)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Wash response time failure	Not used.	—	—	—	—
Calibration Due	System was not maintained within the preset period. Perform maintenance. Increase Calibr. Interval.	M	Maintenance required	Maintenance required	Calibration Due
Outputs in HOLD	Press HOLD in main display. Contact your local sales office in case the HOLD flag reappears.	—	—	—	—
mA output burn high	Upscale burnout situation. Indication of sensor fault. Check measured process values.	—	—	—	—
mA output burn low	Downscale burnout situation. Indication of sensor fault. Check measured process values.	—	—	—	—
Error in mA table	mA table is not properly defined. Execute 'Check values' on the display of FLXA21.	—	—	—	—
mA calculation error	Problem with calculating a mA value. Check the 'Process parameter' for mA.	—	—	—	—
mA configuration error	Problem with mA and Process parameter. Select a correct 'Process parameter' for mA on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
Internal com. Error	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
Chksum err.(CPU AS)	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
EEPROM err.(CPU AS)	Write or read error in the EEPROM. Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure

Table 6.5 DEVICE_STATUS_3 (FLXA21-PH: Sensor Fault)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
pH too high	pH reading above the higher limit. Check connections and cable. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
pH too low	pH reading below the lower limit. Check connection and cable. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Temperature too high	Measured process temperature exceeds the lower limit. Check process temperature. Check programmed sensor type. Check connections and cable.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Temperature too low	Measured process temperature exceeds the upper limit. Check process temperature. Check programmed sensor type. Check connections and cable.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
ORP too high	ORP reading above 1500mV. Check connections and cable. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
ORP too low	ORP reading below -1500mV. Check connections and cable. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
rH too high	rH reading above 100rH. Check connections and cable. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
rH too low	rH reading below 0rH. Check connections and cable. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Impedance 1 too high	Sensor fouled. Liquid earth disconnected. Sensor not immersed. Insufficient electrolyte. Clean or replace sensor. Check sensor immersion. Check electrolyte tank.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Impedance 1 too low	Sensor broken. Damaged or damp connections. Check impedance settings. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Impedance 2 too high	Sensor fouled. Liquid earth disconnected. Sensor not immersed. Insufficient electrolyte. Clean or replace sensor. Check sensor immersion. Check electrolyte tank.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Impedance 2 too low	Sensor broken. Damaged or damp connections. Check impedance settings. Replace sensor.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Temp. comp. matrix error	Temp. comp. matrix is not properly defined. Execute 'Check values' on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
Checksum error in SENCOM (Manufacturing data)	Software problem in SENCOM(Manufacturing data) Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Sensor Electric Failure
Checksum error in SENCOM (Setting data)	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Sensor Electric Failure
EEPROM error in SENCOM	Write or read error in the EEPROM. Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Sensor Electric Failure
SENCOM comm. error	SENCOM communication is not correct. Check connection of SENCOM sensor.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Checksum error	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
Sensor type not correct	SENCOM sensor type is not correct. Change SENCOM sensor type on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
Internal error in SENCOM	Replace SENCOM sensor.	F	Hardware failure electronics.	Failure of the device or armature	Sensor Electric Failure
SENCOM not connected	SENCOM sensor is not connected. Check connection of SENCOM sensor.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
EEPROM error	Write or read error in the EEPROM. Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
Sens. mod. not work	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure

Table 6.6 DEVICE_STATUS_4 (FLXA21-PH: System Warning)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Wash response time failure	Half-value recovery time too long. Check cleaning system. Adjust timing parameters. Replace measuring sensor.	—	—	—	—
Log Book (almost) full	Logbook is more than 95% full. Erase logbooks. Turn logbook "full" warning off.	M	Maintenance required	Maintenance required	Warning for Logbook
Calibration Due	System was not maintained within the preset period. Perform maintenance. Increase Calibr. Interval.	M	Maintenance required	Maintenance required	Warning for Calibration Due

Table 6.7 DEVICE_STATUS_5 (FLXA21-PH: Sensor Warning)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
pH too high	pH reading above the higher limit. Check connections and cable. Replace sensor.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
pH too low	pH reading below the lower limit. Check connection and cable. Replace sensor.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Temperature too high	Measured process temperature exceeds the lower limit. Check process temperature. Check programmed sensor type. Check connections and cable.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Temperature too low	Measured process temperature exceeds the upper limit. Check process temperature. Check programmed sensor type. Check connections and cable.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Temp. comp. error(pH)	Uncompensated value outside matrix limits. Check pH temp. compensation configuration.	S	Failure in measurement	Invalid process condition	Measurement out of Specification
ORP too high	ORP reading above 1500mV. Check connections and cable. Replace sensor.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
ORP too low	ORP reading below -1500mV. Check connections and cable. Replace sensor.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
rH too high	rH reading above 100rH. Check connections and cable. Replace sensor.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
rH too low	rH reading below 0rH. Check connections and cable. Replace sensor.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Impedance 1 too high	Sensor fouled. Liquid earth disconnected. Sensor not immersed. Insufficient electrolyte. Clean or replace sensor. Check sensor immersion. Check electrolyte tank.	M	Failure in measurement	Maintenance demanded	Sensor Warning for Wellness
Impedance 1 too low	Sensor broken. Damaged or damp connections. Check impedance settings. Replace sensor.	M	Failure in measurement	Maintenance demanded	Sensor Warning for Wellness
Impedance 2 too high	Sensor fouled. Liquid earth disconnected. Sensor not immersed. Insufficient electrolyte. Clean or replace sensor. Check sensor immersion. Check electrolyte tank.	M	Failure in measurement	Maintenance demanded	Sensor Warning for Wellness
Impedance 2 too low	Sensor broken. Damaged or damp connections. Check impedance settings. Replace sensor.	M	Failure in measurement	Maintenance demanded	Sensor Warning for Wellness
SENCOM initializing	SENCOM is being initialized. Please wait.	C	—	Function check	Warming up
SENCOM Logbook (almost) full	Calibration logbook is more than 95% full. Erase logbooks. Turn logbook "full" warning off.	M	Maintenance required	Maintenance required	Warning for Logbook
SENCOM sensor changed	SENCOM sensor changed. Go to "New sensor?" on the display of FLXA21. Reset wellness data by selecting 'Yes' or only cancel warning by selecting 'No'.	—	—	—	—

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Temp. comp. matrix error	Temp. comp. matrix is not properly defined. Execute 'Check values' on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error

Table 6.8 DEVICE_STATUS_6

Status	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
HART failure	Check HART settings on the display of FLXA21. Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
Maintenance	Someone maintenances on the display of FLXA21. Check it.	C	—	Function check	Local Operation

Table 6.9 DEVICE_STATUS_8

Status	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
TB in O/S Mode	Blank or Confirm your settings.	F	—	—	Function Block Mode Check
AI3 Empty		F	—	—	Empty(value invalid)
AI3 Hi Hi Alarm		—	—	—	AI3 HI HI/LO LO Alarm
AI3 Hi Alarm		—	—	—	—
AI3 Lo Alarm		—	—	—	—
AI3 Lo_Lo Alarm		—	—	—	AI3 HI HI/LO LO Alarm
AI3 Simulate Active		C*	—	—	AI Simulate Active
AI3 in MAN Mode		C*	—	—	AI Simulate Active
AI3 in O/S Mode		F	—	—	Function Block Mode Check
AI2 Empty		F	—	—	Empty(value invalid)
AI2 Hi Hi Alarm		—	—	—	AI2 HI HI/LO LO Alarm
AI2 Hi Alarm		—	—	—	—
AI2 Lo Alarm		—	—	—	—
AI2 Lo_Lo Alarm		—	—	—	AI2 HI HI/LO LO Alarm
AI2 Simulate Active		C*	—	—	AI Simulate Active
AI2 in MAN Mode		C*	—	—	AI Simulate Active
AI2 in O/S Mode		F	—	—	Function Block Mode Check
AI1 Empty		F	—	—	Empty(value invalid)
AI1 Hi Hi Alarm		—	—	—	AI1 HI HI/LO LO Alarm
AI1 Hi Alarm		—	—	—	—
AI1 Lo Alarm		—	—	—	—
AI1 Lo_Lo Alarm		—	—	—	AI1 HI HI/LO LO Alarm
AI1 Simulate Active		C*	—	—	AI Simulate Active
AI1 in MAN Mode		C*	—	—	AI Simulate Active
AI1 in O/S Mode		F	—	—	Function Block Mode Check

*: This bit is Off 10 seconds after On.

FLXA21-SC

DEVICE_STATUS_1: Same as FLXA21-PH. Refer to Table 6.3.
DEVICE_STATUS_2: Same as FLXA21-PH. Refer to Table 6.4.
DEVICE_STATUS_3: Table 6.10
DEVICE_STATUS_4: Table 6.11
DEVICE_STATUS_5: Table 6.12
DEVICE_STATUS_6: Same as FLXA21-PH. Refer to Table 6.8.
DEVICE_STATUS_7: Not used.
DEVICE_STATUS_8: Same as FLXA21-PH. Refer to Table 6.9.

Table 6.10 DEVICE_STATUS_3 (FLXA21-SC: Sensor Fault)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Conductivity too high	Conductivity exceeds high limit. or Resistivity exceeds low limit. Check connections and cable. Replace sensor. Adjust limits parameter MEASUREMENT_ HIGH_LIMIT	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Conductivity too low	Conductivity exceeds low limit. or Resistivity exceeds high limit. Check connections and cable. Replace sensor. Adjust limits parameter MEASUREMENT_ LOW_LIMIT	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Temperature too high	Measured process temperature exceeds the lower limit. Check process temperature. Check programmed sensor type. Check connections and cable.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Temperature too low	Measured process temperature exceeds the upper limit. Check process temperature. Check programmed sensor type. Check connections and cable.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Measurement unstable	Measurement unstable Check cable and connections. Cable must not be able to 'vibrate'. Check fluid stream for air bubbles.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
Polarization detected	Sensor surface fouled. Conductivity above sensor specification. Clean or replace sensor. Adjust process.	F	Failure in measurement	Failure of the device or armature	Sensor Failure
USP limit exceeded	Conductivity exceeds USP limit. Check ionic exchangers.	S	Failure in measurement	Invalid process condition	USP
USP margin exceeded	Conductivity exceeds USP margin. Poor water quality. Check ionic exchangers.	S	Failure in measurement	Invalid process condition	USP
Conc. table error	Concentration table is not properly defined. Execute 'Check values' on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
2nd comp. matrix error	Problem with calculating T.C. or uncompensated value outside matrix limits. Check temp. compensation configuration on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
1st comp. matrix error	Problem with calculating T.C. or uncompensated value outside matrix limits. Check temp. compensation configuration on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
Checksum error	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
EEPROM error	Write or read error in the EEPROM. Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure
Sens. mod. not work	Contact your local sales office.	F	Hardware failure electronics.	Failure of the device or armature	Electric Failure

Table 6.11 DEVICE_STATUS_4 (FLXA21-SC: System Warning)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Log Book (almost) full	Logbook is more than 95% full. Erase logbooks. Turn logbook "full" warning off.	M	Maintenance required	Maintenance required	Warning for Logbook
Calibration Due	System was not maintained within the preset period. Perform maintenance. Increase Calibr. Interval.	M	Maintenance required	Maintenance required	Warning for Calibration Due

Table 6.12 DEVICE_STATUS_5 (FLXA21-SC: Sensor Warning)

Error	Description and Remedy	NAMUR NE107 category	DIAGNOSIS (Classic)	DIAGNOSIS (Condensed)	DIAGNOSIS EXTENSION
Conductivity too high	Conductivity exceeds high limit. or Resistivity exceeds low limit. Check connections and cable. Replace sensor. Adjust limits parameter MEASUREMENT_ HIGH_LIMIT	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Conductivity too low	Conductivity exceeds low limit. or Resistivity exceeds high limit. Check connections and cable. Replace sensor. Adjust limits parameter MEASUREMENT_ LOW_LIMIT	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Temperature too high	Measured process temperature exceeds the lower limit. Check process temperature. Check programmed sensor type. Check connections and cable.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
Temperature too low	Measured process temperature exceeds the upper limit. Check process temperature. Check programmed sensor type. Check connections and cable.	S	Failure in measurement	Invalid process condition	Sensor Warning for Measurement
1st temp. comp. error	Temp. comp. matrix is not properly defined. Execute 'Check values' on the display of FLXA21.	S	Failure in measurement	Invalid process condition	Measurement out of Specification
2nd temp. comp. error	Temp. comp. matrix 2 is not properly defined. Execute 'Check values' on the display of FLXA21.	S	Failure in measurement	Invalid process condition	Measurement out of Specification
Polarization detected	Sensor surface fouled. Conductivity above sensor specification. Clean or replace sensor. Adjust process.	M	Failure in measurement	Maintenance demanded	Sensor Warning for Wellness
USP limit exceeded	Conductivity exceeds USP limit. Check ionic exchangers.	S	Failure in measurement	Invalid process condition	USP
USP margin exceeded	Conductivity exceeds USP margin. Poor water quality. Check ionic exchangers.	S	Failure in measurement	Invalid process condition	USP
Conc. table error	Concentration table is not properly defined. Execute 'Check values' on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
2nd comp. matrix error	Problem with calculating T.C. or uncompensated value outside matrix limits. Check temp. compensation configuration on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error
1st comp. matrix error	Problem with calculating T.C. or uncompensated value outside matrix limits. Check temp. compensation configuration on the display of FLXA21.	F	Configuration not valid	Failure of the device or armature	Configuration Error

6.5 Status of Each Parameter in Failure Mode

Following tables summarize the value of parameters when LCD display indicates an Alarm or status has some problems.

● FLXA21-PH

Table 6.13 Action of each parameters in failure mode related Sensor Transducer block (Classic status)

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
Write Unlocked	—	—	—	—	—	—	BAD-Configuration Error
Hard Write Lock Switch OFF	—	—	—	—	—	—	
Write Locked	—	—	—	—	—	—	
Hard Write Lock Switch ON	—	—	—	—	—	—	
Abnormal Boot Process	—	—	—	—	—	—	
PB in O/S Mode (AL.40)	—	BAD-Nonspecific	BAD-Nonspecific	BAD-Nonspecific	BAD-Nonspecific	BAD-Nonspecific	
AMP Module Failure2 (AL.02)	—	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure
Wash response time failure	Fault	—	—	—	—	—	BAD-Configuration Error
Calibration Due	Fault	BAD-Nonspecific	—	BAD-Nonspecific	BAD-Nonspecific	—	
Outputs in HOLD	Fault	—	—	—	—	—	
mA output burn high	Fault	—	—	—	—	—	
mA output burn low	Fault	—	—	—	—	—	
Error in mA table	Fault	—	—	—	—	—	
mA calculation error	Fault	—	—	—	—	—	
mA configuration error	Fault	BAD-Configuration Error	BAD-Configuration Error	BAD-Configuration Error	BAD-Configuration Error	BAD-Configuration Error	
Internal com. error	Fault	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	
Chksum err. (CPU AS)	Fault	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	
EEPROM err. (CPU AS)	Fault	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	
pH too high	Fault	BAD-Sensor Failure	—	—	BAD-Sensor Failure	—	
pH too low	Fault	BAD-Sensor Failure	—	—	BAD-Sensor Failure	—	
Temperature too high	Fault	BAD-Sensor Failure	BAD-Sensor Failure	—	BAD-Sensor Failure	—	
Temperature too low	Fault	BAD-Sensor Failure	BAD-Sensor Failure	—	BAD-Sensor Failure	—	
ORP too high	Fault	—	—	BAD-Sensor Failure	—	—	
ORP too low	Fault	—	—	BAD-Sensor Failure	—	—	
rH too high	Fault	—	—	—	BAD-Sensor Failure	—	
rH too low	Fault	—	—	—	BAD-Sensor Failure	—	
Impedance 1 too high	Fault	BAD-Sensor Failure	—	BAD-Sensor Failure	BAD-Sensor Failure	—	
Impedance 1 too low	Fault	BAD-Sensor Failure	—	BAD-Sensor Failure	BAD-Sensor Failure	—	
Impedance 2 too high	Fault	BAD-Sensor Failure	—	BAD-Sensor Failure	BAD-Sensor Failure	—	
Impedance 2 too low	Fault	BAD-Sensor Failure	—	BAD-Sensor Failure	BAD-Sensor Failure	—	
Temp. comp. matrix error	Fault	BAD-Configuration Error	—	—	—	—	
Checksum error in SENCOM (Manufacturing data)	Fault	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
Checksum error in SENCOM (Setting data)	Fault	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Configuration Error
EEPROM error in SENCOM	Fault	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	
SENCOM comm. error	Fault	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	
Checksum error	Fault	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	
Sensor type not correct	Fault	BAD-Configuration Error	BAD-Configuration Error	BAD-Configuration Error	BAD-Configuration Error	BAD-Configuration Error	
Internal error in SENCOM	Fault	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	
SENCOM not connected	Fault	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	
EEPROM error	Fault	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	
Sens. mod. not work	Fault	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	
Logbook (almost) full	Warning	—	—	—	—	—	
Wash response time failure	Warning	—	—	—	—	—	
Calibration Due	Warning	UNCERTAIN-Nonspecific	—	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	—	
pH too high	Warning	UNCERTAIN-sensor conversion not accurate	—	—	UNCERTAIN-sensor conversion not accurate	—	
pH too low	Warning	UNCERTAIN-sensor conversion not accurate	—	—	UNCERTAIN-sensor conversion not accurate	—	
Temperature too high	Warning	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	—	
Temperature too low	Warning	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	—	
Temp. comp. error(pH)	Warning	UNCERTAIN-Nonspecific	—	—	UNCERTAIN-Nonspecific	—	
ORP too high	Warning	—	—	UNCERTAIN-sensor conversion not accurate	—	—	
ORP too low	Warning	—	—	UNCERTAIN-sensor conversion not accurate	—	—	
rH too high	Warning	—	—	—	UNCERTAIN-sensor conversion not accurate	—	
rH too low	Warning	—	—	—	UNCERTAIN-sensor conversion not accurate	—	
Impedance 1 too high	Warning	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	
Impedance 1 too low	Warning	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
Impedance 2 too high	Warning	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	BAD-Configuration Error
Impedance 2 too low	Warning	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	
SENCOM Logbook full	Warning	—	—	—	—	—	
SENCOM sensor changed	Warning	—	—	—	—	—	
Temp. comp. matrix error	Warning	UNCERTAIN-Configuration Error	—	—	—	—	
SENCOM initializing	Warning	BAD-Nonspecific	—	BAD-Nonspecific	BAD-Nonspecific	—	
HART failure	—	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure	BAD-Device Failure
Maintenance	—	—	—	—	—	—	BAD-Configuration Error
TB OOS	—	BAD-out of service	BAD-out of service	BAD-out of service	BAD-out of service	BAD-out of service	BAD-out of service
AI3 Empty	—	—	—	—	—	—	BAD-Configuration Error
AI3 Hi Hi Alarm	—	—	—	—	—	—	
AI3 Hi Alarm	—	—	—	—	—	—	
AI3 Lo Alarm	—	—	—	—	—	—	
AI3 Lo Lo Alarm	—	—	—	—	—	—	
AI3 SIM	—	—	—	—	—	—	
AI3 MAN	—	—	—	—	—	—	
AI3 OOS	—	—	—	—	—	—	
AI2 Empty	—	—	—	—	—	—	
AI2 Hi Hi Alarm	—	—	—	—	—	—	
AI2 Hi Alarm	—	—	—	—	—	—	
AI2 Lo Alarm	—	—	—	—	—	—	
AI2 Lo Lo Alarm	—	—	—	—	—	—	
AI2 SIM	—	—	—	—	—	—	
AI2 MAN	—	—	—	—	—	—	
AI2 OOS	—	—	—	—	—	—	
AI1 Empty	—	—	—	—	—	—	
AI1 Hi Hi Alarm	—	—	—	—	—	—	
AI1 Hi Alarm	—	—	—	—	—	—	
AI1 Lo Alarm	—	—	—	—	—	—	
AI1 Lo Lo Alarm	—	—	—	—	—	—	
AI1 SIM	—	—	—	—	—	—	
AI1 MAN	—	—	—	—	—	—	
AI1 OOS	—	—	—	—	—	—	

Table 6.14 Action of each parameters in failure mode related Sensor Transducer block (Condensed status)

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
Write Unlocked	—	—	—	—	—	—	UNCERTAIN-initial value
Hard Write Lock Switch OFF	—	—	—	—	—	—	
Write Locked	—	—	—	—	—	—	
Hard Write Lock Switch ON	—	—	—	—	—	—	
Abnormal Boot Process	—	—	—	—	—	—	
PB in O/S Mode (AL.40)	—	BAD-passivated (diagnostis alerts inhibited)					
AMP Module Failure2 (AL.02)	—	BAD-maintenance alarm, more diagnosis available					
Wash response time failure	Fault	—	—	—	—	—	UNCERTAIN-initial value
Calibration Due	Fault	GOOD-maintenance demanded	—	GOOD-maintenance demanded	GOOD-maintenance demanded	—	
Outputs in HOLD	Fault	—	—	—	—	—	
mA output burn high	Fault	—	—	—	—	—	
mA output burn low	Fault	—	—	—	—	—	
Error in mA table	Fault	—	—	—	—	—	
mA calculation error	Fault	—	—	—	—	—	
mA configuration error	Fault	BAD-maintenance alarm, more diagnosis available					
Internal com. error	Fault	BAD-maintenance alarm, more diagnosis available					
Chksum err. (CPU AS)	Fault	BAD-maintenance alarm, more diagnosis available					
EEPROM err. (CPU AS)	Fault	BAD-maintenance alarm, more diagnosis available					
pH too high	Fault	BAD-maintenance alarm, more diagnosis available	—	—	BAD-maintenance alarm, more diagnosis available	—	
pH too low	Fault	BAD-maintenance alarm, more diagnosis available	—	—	BAD-maintenance alarm, more diagnosis available	—	
Temperature too high	Fault	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	—	
Temperature too low	Fault	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	—	
ORP too high	Fault	—	—	BAD-maintenance alarm, more diagnosis available	—	—	
ORP too low	Fault	—	—	BAD-maintenance alarm, more diagnosis available	—	—	

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
rH too high	Fault	—	—	—	BAD-maintenance alarm, more diagnosis available	—	UNCERTAIN-initial value
rH too low	Fault	—	—	—	BAD-maintenance alarm, more diagnosis available	—	
Impedance 1 too high	Fault	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	
Impedance 1 too low	Fault	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	
Impedance 2 too high	Fault	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	
Impedance 2 too low	Fault	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	
Temp. comp. matrix error	Fault	BAD-maintenance alarm, more diagnosis available	—	—	—	—	
Checksum error in SENCOM (Manufacturing data)	Fault	BAD-maintenance alarm, more diagnosis available					
Checksum error in SENCOM (Setting data)	Fault	BAD-maintenance alarm, more diagnosis available					
EEPROM error in SENCOM	Fault	BAD-maintenance alarm, more diagnosis available					
SENCOM comm. error	Fault	BAD-maintenance alarm, more diagnosis available					
Checksum error	Fault	BAD-maintenance alarm, more diagnosis available					
Sensor type not correct	Fault	BAD-maintenance alarm, more diagnosis available					
Internal error in SENCOM	Fault	BAD-maintenance alarm, more diagnosis available					
SENCOM not connected	Fault	BAD-maintenance alarm, more diagnosis available					
EEPROM error	Fault	BAD-maintenance alarm, more diagnosis available					
Sens. mod. not work	Fault	BAD-maintenance alarm, more diagnosis available					
Logbook (almost) full	Warning	GOOD-maintenance required					
Wash response time failure	Warning	—	—	—	—	—	
Calibration Due	Warning	GOOD-maintenance required	—	GOOD-maintenance required	GOOD-maintenance required	—	
pH too high	Warning	UNCERTAIN-process related, no maintenance	—	—	UNCERTAIN-process related, no maintenance	—	

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
pH too low	Warning	UNCERTAIN-process related, no maintenance	—	—	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-initial value
Temperature too high	Warning	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	—	
Temperature too low	Warning	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	—	
Temp. comp. error(pH)	Warning	UNCERTAIN-process related, no maintenance	—	—	UNCERTAIN-process related, no maintenance	—	
ORP too high	Warning	—	—	UNCERTAIN-process related, no maintenance	—	—	
ORP too low	Warning	—	—	UNCERTAIN-process related, no maintenance	—	—	
rH too high	Warning	—	—	—	UNCERTAIN-process related, no maintenance	—	
rH too low	Warning	—	—	—	UNCERTAIN-process related, no maintenance	—	
Impedance 1 too high	Warning	UNCERTAIN-maintenance demanded	—	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	—	
Impedance 1 too low	Warning	UNCERTAIN-maintenance demanded	—	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	—	
Impedance 2 too high	Warning	UNCERTAIN-maintenance demanded	—	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	—	
Impedance 2 too low	Warning	UNCERTAIN-maintenance demanded	—	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	—	
SENCOM Logbook full	Warning	GOOD-maintenance required					
SENCOM sensor changed	Warning	—	—	—	—	—	
Temp. comp. matrix error	Warning	BAD-maintenance alarm, more diagnosis available	—	—	—	—	
SENCOM initializing	—	BAD-function check / local override, value not usable					
HART error	—	BAD-maintenance alarm, more diagnosis available					
Maintenance	—	BAD-function check / local override, value not usable					
TB OOS	—	BAD-passivated (diagnostis alerts inhibited)					

Alarm / Status		TB .status					
		pH1	Temperature1	ORP1	rH1	Ref. impedance1	Empty
AI3 Empty	—	—	—	—	—	—	UNCERTAIN-initial value
AI3 Hi Hi Alarm	—	—	—	—	—	—	
AI3 Hi Alarm	—	—	—	—	—	—	
AI3 Lo Alarm	—	—	—	—	—	—	
AI3 Lo Lo Alarm	—	—	—	—	—	—	
AI3 SIM	—	—	—	—	—	—	
AI3 MAN	—	—	—	—	—	—	
AI3 OOS	—	—	—	—	—	—	
AI2 Empty	—	—	—	—	—	—	
AI2 Hi Hi Alarm	—	—	—	—	—	—	
AI2 Hi Alarm	—	—	—	—	—	—	
AI2 Lo Alarm	—	—	—	—	—	—	
AI2 Lo Lo Alarm	—	—	—	—	—	—	
AI2 SIM	—	—	—	—	—	—	
AI2 MAN	—	—	—	—	—	—	
AI2 OOS	—	—	—	—	—	—	
AI1 Empty	—	—	—	—	—	—	
AI1 Hi Hi Alarm	—	—	—	—	—	—	
AI1 Hi Alarm	—	—	—	—	—	—	
AI1 Lo Alarm	—	—	—	—	—	—	
AI1 Lo Lo Alarm	—	—	—	—	—	—	
AI1 SIM	—	—	—	—	—	—	
AI1 MAN	—	—	—	—	—	—	
AI1 OOS	—	—	—	—	—	—	

FLXA21-SC

Table 6.15 Action of each parameters in failure mode related Sensor Transducer block (Classic status)

Alarm / Status		TB .status						
		Conduct1-TC1 Resist1-TC1	Conduct1-TC2 Resist1-TC2	Temperature1	Concent1-TC1	Concent1-TC2	USP1	Empty
Write Unlocked	—	—	—	—	—	—	—	BAD-Configuration Error
Hard Write Lock Switch OFF	—	—	—	—	—	—	—	
Write Locked	—	—	—	—	—	—	—	
Hard Write Lock Switch ON	—	—	—	—	—	—	—	
Abnormal Boot Process	—	—	—	—	—	—	—	
PB in O/S Mode (AL.40)	—	BAD-Nonspecific						
AMP Module Failure2 (AL.02)	—	BAD-Device Failure						
Calibration Due	Fault	BAD-Nonspecific	BAD-Nonspecific	—	BAD-Nonspecific	BAD-Nonspecific	BAD-Nonspecific	BAD-Configuration Error
Outputs in HOLD	Fault	—	—	—	—	—	—	
mA output burn high	Fault	—	—	—	—	—	—	
mA output burn low	Fault	—	—	—	—	—	—	
Error in mA table	Fault	—	—	—	—	—	—	
mA calculation error	Fault	—	—	—	—	—	—	
mA configuration error	Fault	BAD-Configuration Error						
Internal com. error	Fault	BAD-Device Failure						
Chksum err. (CPU AS)	Fault	BAD-Device Failure						
EEPROM err. (CPU AS)	Fault	BAD-Device Failure						
Conductivity too high	Fault	BAD-Sensor Failure	BAD-Sensor Failure	—	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	
Conductivity too low	Fault	BAD-Sensor Failure	BAD-Sensor Failure	—	BAD-Sensor Failure	BAD-Sensor Failure	BAD-Sensor Failure	
Temperature too high	Fault	BAD-Sensor Failure						
Temperature too low	Fault	BAD-Sensor Failure						
Measurement unstable	Fault	BAD-Sensor Failure						
Polarization detected	Fault	BAD-Nonspecific	BAD-Nonspecific	—	BAD-Nonspecific	BAD-Nonspecific	BAD-Sensor Failure	
USP limit exceeded	Fault	BAD-Nonspecific	BAD-Nonspecific	—	BAD-Nonspecific	BAD-Nonspecific	BAD-Nonspecific	
USP margin exceeded	Fault	BAD-Nonspecific	BAD-Nonspecific	—	BAD-Nonspecific	BAD-Nonspecific	BAD-Nonspecific	
Conc. table error	Fault	—	—	—	BAD-Configuration Error	—	—	
2nd comp. matrix error	Fault	BAD-Configuration Error	BAD-Configuration Error	—	BAD-Configuration Error	BAD-Configuration Error	—	
1st. comp. matrix error	Fault	BAD-Configuration Error	BAD-Configuration Error	—	BAD-Configuration Error	BAD-Configuration Error	—	
Checksum error	Fault	BAD-Device Failure						
EEPROM error	Fault	BAD-Device Failure						
Sens. mod. not work	Fault	BAD-Device Failure						

Alarm / Status		TB .status						
		Conduct1-TC1 Resist1-TC1	Conduct1-TC2 Resist1-TC2	Temperature1	Concent1-TC1	Concent1-TC2	USP1	Empty
Logbook (almost) full	Warning	—	—	—	—	—	—	BAD-Configuration Error
Calibration Due	Warning	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	—	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	
Conductivity too high	Warning	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	
Conductivity too low	Warning	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	
Temperature too high	Warning	UNCERTAIN-sensor conversion not accurate						
Temperature too low	Warning	UNCERTAIN-sensor conversion not accurate						
1st temp. comp. error	Warning	UNCERTAIN-Nonspecific	—	—	—	UNCERTAIN-Nonspecific	—	
2nd temp. comp. error	Warning	—	UNCERTAIN-Nonspecific	—	UNCERTAIN-Nonspecific	—	—	
Polarization detected	Warning	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	—	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	UNCERTAIN-sensor conversion not accurate	
USP limit exceeded	Warning	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	—	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	
USP margin exceeded	Warning	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	—	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	UNCERTAIN-Nonspecific	
Conc. table error	Warning	—	—	—	UNCERTAIN-Configuration Error	—	—	
2nd. comp. matrix error	Warning	UNCERTAIN-Configuration Error	UNCERTAIN-Configuration Error	—	UNCERTAIN-Configuration Error	UNCERTAIN-Configuration Error	—	
1st. comp. matrix error	Warning	UNCERTAIN-Configuration Error	UNCERTAIN-Configuration Error	—	UNCERTAIN-Configuration Error	UNCERTAIN-Configuration Error	—	
Internal com. error	—	BAD-Device Failure						
Maintenance	—	—	—	—	—	—	—	BAD-Configuration Error
TB OOS	—	BAD-out of service						
AI3 Empty	—	—	—	—	—	—	—	BAD-Configuration Error
AI3 Hi Hi Alarm	—	—	—	—	—	—	—	
AI3 Hi Alarm	—	—	—	—	—	—	—	
AI3 Lo Alarm	—	—	—	—	—	—	—	
AI3 Lo_Lo Alarm	—	—	—	—	—	—	—	
AI3 SIM	—	—	—	—	—	—	—	
AI3 MAN	—	—	—	—	—	—	—	
AI3 OOS	—	—	—	—	—	—	—	
AI2 Empty	—	—	—	—	—	—	—	
AI2 Hi Hi Alarm	—	—	—	—	—	—	—	
AI2 Hi Alarm	—	—	—	—	—	—	—	
AI2 Lo Alarm	—	—	—	—	—	—	—	
AI2 Lo_Lo Alarm	—	—	—	—	—	—	—	
AI2 SIM	—	—	—	—	—	—	—	
AI2 MAN	—	—	—	—	—	—	—	
AI2 OOS	—	—	—	—	—	—	—	
AI1 Empty	—	—	—	—	—	—	—	
AI1 Hi Hi Alarm	—	—	—	—	—	—	—	
AI1 Hi Alarm	—	—	—	—	—	—	—	
AI1 Lo Alarm	—	—	—	—	—	—	—	
AI1 Lo_Lo Alarm	—	—	—	—	—	—	—	
AI1 SIM	—	—	—	—	—	—	—	
AI1 MAN	—	—	—	—	—	—	—	
AI1 OOS	—	—	—	—	—	—	—	

Table 6.16 Action of each parameters in failure mode related Sensor Transducer block (Condensed status)

Alarm / Status		TB .status						
		Conduct1-TC1 Resist1-TC1	Conduct1-TC2 Resist1-TC2	Temperature1	Concent1-TC1	Concent1-TC2	USP1	Empty
Write Unlocked	—	—	—	—	—	—	—	BAD-passivated (diagnostis alerts inhibited
Hard Write Lock Switch OFF	—	—	—	—	—	—	—	
Write Locked	—	—	—	—	—	—	—	
Hard Write Lock Switch ON	—	—	—	—	—	—	—	
Abnormal Boot Process	—	—	—	—	—	—	—	
PB in O/S Mode (AL.40)	—	BAD-passivated (diagnostis alerts inhibited)						
AMP Module Failure2 (AL.02)	—	BAD-maintenance alarm, more diagnosis available						
Calibration Due	Fault	GOOD-maintenance demanded	GOOD-maintenance demanded	—	GOOD-maintenance demanded	GOOD-maintenance demanded	GOOD-maintenance demanded	UNCERTAIN-initial value
Outputs in HOLD	Fault	—	—	—	—	—	—	
mA output burn high	Fault	—	—	—	—	—	—	
mA output burn low	Fault	—	—	—	—	—	—	
Error in mA table	Fault	—	—	—	—	—	—	
mA calculation error	Fault	—	—	—	—	—	—	
mA configuration error	Fault	BAD-maintenance alarm, more diagnosis available						
Internal com. error	Fault	BAD-maintenance alarm, more diagnosis available						
Chksum err. (CPU AS)	Fault	BAD-maintenance alarm, more diagnosis available						
EEPROM err. (CPU AS)	Fault	BAD-maintenance alarm, more diagnosis available						
Conductivity too high	Fault	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	—	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	
Conductivity too low	Fault	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	—	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	
Temperature too high	Fault	BAD-maintenance alarm, more diagnosis available						
Temperature too low	Fault	BAD-maintenance alarm, more diagnosis available						
Measurement unstable	Fault	BAD-maintenance alarm, more diagnosis available						
Polarization detected	Fault	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	—	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	BAD – maintenance alarm, more diagnosis available	
USP limit exceeded	Fault	UNCERTAIN - process related, no maintenance	UNCERTAIN - process related, no maintenance	—	UNCERTAIN - process related, no maintenance	UNCERTAIN - process related, no maintenance	UNCERTAIN - process related, no maintenance	
USP margin exceeded	Fault	UNCERTAIN - process related, no maintenance	UNCERTAIN - process related, no maintenance	—	UNCERTAIN - process related, no maintenance	UNCERTAIN - process related, no maintenance	UNCERTAIN - process related, no maintenance	

Alarm / Status		TB .status						
		Conduct1-TC1 Resist1-TC1	Conduct1-TC2 Resist1-TC2	Temperature1	Concent1-TC1	Concent1-TC2	USP1	Empty
Conc. table error	Fault	—	—	—	BAD-maintenance alarm, more diagnosis available	—	—	UNCERTAIN-initial value
2nd comp. matrix error	Fault	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	
1st. comp. matrix error	Fault	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	
Checksum error	Fault	BAD-maintenance alarm, more diagnosis available						
EEPROM error	Fault	BAD-maintenance alarm, more diagnosis available						
Sens. mod. not work	Fault	BAD-maintenance alarm, more diagnosis available						
Logbook (almost) full	Warning	GOOD-maintenance required						
Calibration Due	Warning	GOOD-maintenance required	GOOD-maintenance required	—	GOOD-maintenance required	GOOD-maintenance required	GOOD-maintenance required	
Conductivity too high	Warning	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	
Conductivity too low	Warning	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	
Temperature too high	Warning	UNCERTAIN-process related, no maintenance						
Temperature too low	Warning	UNCERTAIN-process related, no maintenance						
1st temp. comp. error	Warning	UNCERTAIN-process related, no maintenance	—	—	—	UNCERTAIN-process related, no maintenance	—	
2nd temp. comp. error	Warning	—	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	—	—	
Polarization detected	Warning	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	—	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	UNCERTAIN-maintenance demanded	
USP limit exceeded	Warning	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	
USP margin exceeded	Warning	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	—	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	UNCERTAIN-process related, no maintenance	
Conc. table error	Warning	—	—	—	BAD-maintenance alarm, more diagnosis available	—	—	
2nd. comp. matrix error	Warning	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	

Alarm / Status		TB .status						
		Conduct1-TC1 Resist1-TC1	Conduct1-TC2 Resist1-TC2	Temperature1	Concent1-TC1	Concent1-TC2	USP1	Empty
1st. comp. matrix error	Warning	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	BAD-maintenance alarm, more diagnosis available	BAD-maintenance alarm, more diagnosis available	—	UNCERTAIN-initial value
Internal com. error	—	BAD-maintenance alarm, more diagnosis available						
Maintenance	—	BAD-function check / local override, value not usable						
TB OOS	—	BAD-passivated (diagnostis alerts inhibited)						
AI3 Empty	—	—	—	—	—	—	—	UNCERTAIN-initial value
AI3 Hi Hi Alarm	—	—	—	—	—	—	—	
AI3 Hi Alarm	—	—	—	—	—	—	—	
AI3 Lo Alarm	—	—	—	—	—	—	—	
AI3 Lo_Lo Alarm	—	—	—	—	—	—	—	
AI3 SIM	—	—	—	—	—	—	—	
AI3 MAN	—	—	—	—	—	—	—	
AI3 OOS	—	—	—	—	—	—	—	
AI2 Empty	—	—	—	—	—	—	—	
AI2 Hi Hi Alarm	—	—	—	—	—	—	—	
AI2 Hi Alarm	—	—	—	—	—	—	—	
AI2 Lo Alarm	—	—	—	—	—	—	—	
AI2 Lo_Lo Alarm	—	—	—	—	—	—	—	
AI2 SIM	—	—	—	—	—	—	—	
AI2 MAN	—	—	—	—	—	—	—	
AI2 OOS	—	—	—	—	—	—	—	
AI1 Empty	—	—	—	—	—	—	—	
AI1 Hi Hi Alarm	—	—	—	—	—	—	—	
AI1 Hi Alarm	—	—	—	—	—	—	—	
AI1 Lo Alarm	—	—	—	—	—	—	—	
AI1 Lo_Lo Alarm	—	—	—	—	—	—	—	
AI1 SIM	—	—	—	—	—	—	—	
AI1 MAN	—	—	—	—	—	—	—	
AI1 OOS	—	—	—	—	—	—	—	

Revision Record

- Manual Title : FLXA21 2-Wire Analyzer PROFIBUS PA Communication
- Manual No. : IM 12A01A02-72E

Oct. 2015/3rd Edition
Correction (Page iv)

Apr. 2015/2nd Edition
Correction (Pages 2-1 and 4-4)

Feb. 2015/1st Edition
Newly published

Yokogawa Electric Corporation
2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750, JAPAN
Homepage: http://www.yokogawa.com/

User's Manual

Model FLXA21
2-Wire Analyzer
PROFIBUS PA Communication

Supplement

Thank you for selecting our FLXA21 2-Wire Analyzer.

Though User's Manual, IM 12A01A02-72E 3rd Edition, is provided with the product, an addition to the manual has been made.

Please use the following contents after a reading before using the FLXA21.

Note

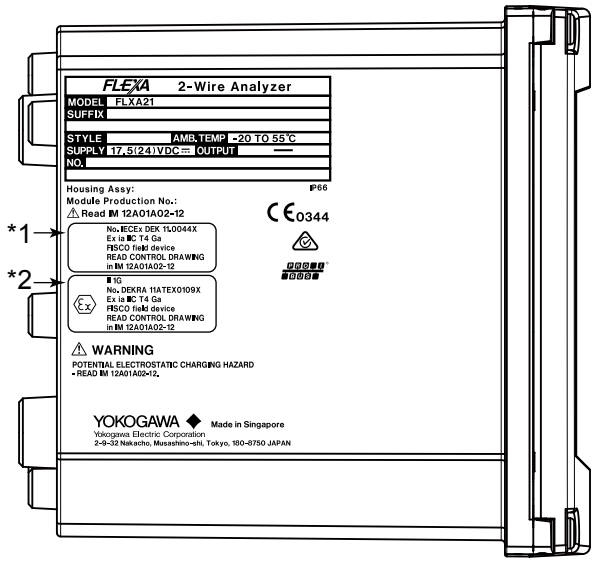
◆ The suffix code "-CB" (Output: Intrinsic safety for ATEX, IECEx) is added.

■ Mark position of intrinsic safety

The mark position of intrinsic safety is shown as follows

FLXA21-D-P-D-**CB**-□1-NN-**P**-N-LA-N-NN (PROFIBUS PA)

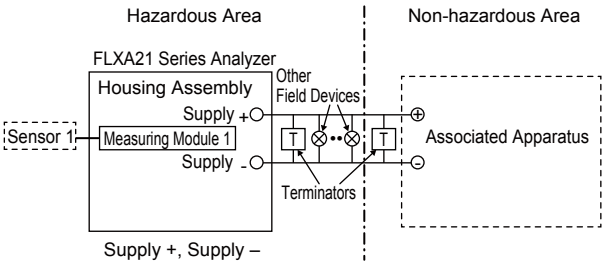
-P (PROFIBUS PA)



*1: This marking conforms to Intrinsic safety of IECEx.
*2: This marking conforms to Intrinsic safety of ATEX.

Regulatory Compliance

ATEX and IECEx
Control Drawing (FOUNDATION Fieldbus / PROFIBUS PA Type)



Supply +, Supply –
FISCO field device, or the following parameters
Ui: 24 V
Ii: 250 mA
Pi: 1.2 W
Ci: 2.72 nF
Li: 0 mH

Measuring Module 1

	Type of Measuring Module		
	pH, SC, DO	**ISC**	**SENCOM**
Uo	11.76 V	11.76 V	5.36 V
Io	116.5 mA	60.6 mA	106.16 mA
Po	0.3424 W	0.178 W	0.1423 W
Co	100 nF	100 nF	31 µF
Lo	1.7 mH	8 mH	0.45 mH

Specific Conditions of Use
- Precautions shall be taken to minimize the risk from electrostatic discharge of non-metallic parts of the enclosure.

Notes:
1. The associated apparatus must be a linear source or FISCO power supply.
2. Sensor 1 may be simple apparatus or intrinsically safe apparatus.
3. WARNING – POTENTIAL ELECTROSTATIC CHARGING HAZARD – SEE USER'S MANUAL

Intrinsic safety (suffix code Type: -CB):
ATEX Intrinsic safety approval
Applicable standard
Explosive Atmospheres
EN 60079-0: 2012/A11: 2013 Equipment - General requirements
EN 60079-11: 2012 Equipment protection by Intrinsic safety "i"
EN 60079-26: 2007 Equipment with equipment protection level (EPL) Ga
EN 60529: 1992 Degrees of protectionprovided by enclosures (IP Code)
Type of protection
II 1G Ex ia IIC Ga
Group: II
Category: 1G
T4: for ambient temperature:–20 to 55ºC
Atmosphere pressure: 80 kPa (0.8 bar) to 110 kPa (1.1 bar)
Degree of Protection of the Enclosure: IP66
IECEx Intrinsic safety approval
Applicable standard
IEC 60079-0:2011 Part 0: Equipment - General requirements
IEC 60079-11: 2011 Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-26: 2006 Part 26: Equipment with equipment protection level (EPL) Ga
IEC 60529: 2001 Degrees of protection provided by enclosures (IP Code)
Type of protection
Ex ia IIC Ga
T4: for ambient temperature:–20 to 55ºC
Atmosphere pressure: 80 kPa (0.8 bar) to 110 kPa (1.1 bar)
Degree of Protection of the Enclosure: IP66